INDEX

TO THE

TRANSACTIONS AND JOURNAL

OF THE

NEW ENGLAND WATER WORKS ASSOCIATION

1882 to 1930

Transactions, 1883 to 1885

Journal, Volumes I to XLIV, 1886 to 1930

Prepared under authority of the
EXECUTIVE COMMITTEE

BOSTON, MASS.
The Fort Hill Press
SAMUEL USHER
1931

FOREWORD.

Within a year of its formation in 1882, the New England Water Works Association issued an official publication. For the years 1883, 1884 and 1885 it published its Transactions, a volume for each year. The JOURNAL was established in 1886. The quarterly issues of the first two volumes were paged separately, but beginning with Volume III the paging was made consecutive within each volume. Volumes I to XV began with the September issue. In order to conform to the calendar year, later volumes were made to begin with the March issue, Volume XV (1900–1901) containing six issues to permit this change.

The first comprehensive Index to the Transactions and JOURNAL of the Association was issued in 1904, the second in 1916. The present Index is the third to be compiled and carries through Volume XLIV, 1930; it forms Part II of the March JOURNAL, Volume XLV, 1931.

The Index comprises three sections: a Subject Index, an Author Index and an Index to Affairs of the Association. The great expansion of the JOURNAL since the Index of 1916 was prepared has made it necessary to forego reference to detailed subject matter found within papers but covered by a more comprehensive title. It has required, furthermore, that cross-referencing be limited to topics rather than papers.

The Subject Index contains a classification of papers, topical discussions, and reports of technical committees of the Association. The titles to these are given substantially as printed in the JOURNAL. A small group of papers not related to water-works matters is classified under "Miscellaneous."

The Author Index lists all papers published over an author's name, lengthy titles being abridged and obscure titles being reworded.

The Index to Association Affairs classifies biographical notices and portraits, non-technical committee reports and matters of general interest to the Association. Proceedings of meetings including reports of officers and standing non-technical committees are not indexed since they appear regularly in each volume. Presidential addresses, likewise, are not indexed unless they are confined to a specific technical subject. In the latter case they appear in the Subject and Author Indexes.

Throughout the Index the volume of the JOURNAL appears in small Roman numerals, the page in larger Arabic numerals and the year in Arabic numerals within parentheses. The page number indicates the first page of the article. The three volumes of Transactions are identified by including the abbreviation "Trans." in the parentheses enclosing the year of publication. The separately paged quarterly issues of Volumes I and II are identified by interpolating the month of issue between the volume number and page number. In the Subject Index the topic is printed in bold-faced type and the author's name is given in parentheses. Discussions of papers are not indicated separately as they are more or less regular in occurrence. In the Author Index the author's name appears in bold-faced type above the titles of his papers. The subject matter of the Index to Association Affairs is printed in bold-faced type.

GORDON M. FAIR,
Editor.

Boston, Mass.
March 31, 1931.

SUBJECT INDEX.

ACCOUNTING AND RECORDS.

Bulletin of Hoquiam Water Co. for water users. (H. C. Heermans.) XXII 462 (1908).
Card system of service locations. (A. W. F. Brown.) IX 226 (1894–95).
Classified cash book. (Albert L. Sawyer.) XXXI 54 (1917).
Depreciation in water-works accounts, with reference to uniform reports. (H. S. Chase.) XXIV 305 (1910).
Depreciation in water-works operation and accounting. (Leonard Metcalf.) XXIV 442 (1910).
Gallons *vs.* liters and cubic meters. (Frederick Brooks.) XVII 258 (1903).
Meter reading and billing system, Rochester, N. Y. (S. B. Story.) XXXIX 71 (1925).
Meter reading, billing and collecting revenue, Providence, R. I. (A. P. Murray.) XL 457 (1926).
Meter records for small water works. (A. W. F. Brown.) XXX 427 (1916).
Office methods, regulations and the water consumer. (R. J. Newsom.) XXXIV 264 (1920).
Recording location of mains and services. (G. A. Kimball.) VIII 157 (1893–94).
Sinking-fund formulæ. I March 30 (1886–87); I June 27 (1886–87).
Sinking-fund tables. (Desmond FitzGerald.) VI 185 (1891–92); (F. L. Fuller.) XII 103 (1897–98).
Stealing water. (G. A. Kimball.) IV 187 (1889–90).
Underground records. (R. F. Johnson.) XXXVI 95 (1922).
Uniform accounting. (Committee report.) XXXV 57, 373 (1921).
Uniformity in annual reports. (Committee report.) 118 (Trans. 1885).
Uniformity in municipal reports. (M. N. Baker.) XV 189 (1900–01).
Water-works accounting. (J. F. J. Mulhall.) XIX 395 (1905); (E. L. Pride.) XXXI 63 (1917).
Water-works records. (A. S. Glover.) IV 69 (1889–90).

See also **MANAGEMENT, RATES and VALUATION.**

AËRATION. *See* **TREATMENT.**

ALARMS. *See* **GAGES.**

ALGÆ. *See* **QUALITY and TREATMENT.**

ANALYSIS OF WATER.

Analysis of water — chemical, microscopical and bacteriological. (T. M. Drown.) IV 79 (1889–90).
Bacteriological analysis of water and its interpretation. (C.-E. A. Winslow.) XV 459 (1900–01).
Biological analysis of water. (W. T. Sedgwick.) II June 7 (1887–88); IV 50 (1889–90).
Color and its relation to character of water. (F. S. Hollis.) XIII 94 (1898–99).
Effect of sunlight on determination of chlorine by ortho-tolidin method. (F. R. McCrumb and W. R. Kenny.) XLII 410 (1928).
Elimination of errors in the ortho-tolidin method. (F. R. McCrumb.) XLI 386 (1927).
Nature of color in water. (Thorndike Saville.) XXXI 78 (1917).
Physical properties of water. (Allen Hazen.) XVII 21 (1903).
Turbidimeter. (Charles Anthony.) XVI 256 (1902).

See also **QUALITY and TREATMENT.**

AQUATIC GROWTHS.
See **QUALITY and TREATMENT.**

AQUEDUCTS. *See* **CONDUITS.**

ARCHITECTURE AND LANDSCAPING.

Beauty — an investment. (J. C. Stevens.) XLIII 370 (1929).
Landscape problems of Spot Pond Reservoir, Boston, Mass. (F. L. Olmsted.) XV 272 (1900–01).

ASSESSMENTS. *See* **RATES.**

AUTOMATIC SPRINKLERS. *See* **FIRES.**

AUXILIARY SUPPLIES.
See **FIRES and SUPPLY.**

BACKFILLING. *See* **EXCAVATION.**

BACTERIOLOGY OF WATER.
See **ANALYSIS, QUALITY and TREATMENT.**

BIOLOGY OF WATER.
See **ANALYSIS, FISH, QUALITY and TREATMENT.**

BOILERS. *See* **PUMPING.**

BONDS, WATER-WORKS.
See **MANAGEMENT.**

BRASS PIPE.
See **HEALTH and PIPE (SERVICE).**

BREAKS. *See* **WASTE.**

CASTINGS, SPECIAL.
See **PIPE (CAST IRON) and SPECIFICATIONS.**

CAST-IRON PIPE.
See **PIPE and SPECIFICATIONS.**

CATCHMENT AREAS. *See* **WATERSHEDS.**

CEMENT. *See* **MATERIALS.**

CEMENT-LINED PIPE.
See **PIPE and PIPE LINING and COATING.**

CEMENT PIPE. *See* **PIPE.**

CHARGES. *See* **RATES.**

CHEMICAL TREATMENT.
See **TREATMENT.**

CHEMISTRY OF WATER.
See **ANALYSIS, QUALITY and TREATMENT.**

CHLORINATION. *See* **TREATMENT.**

COAGULATION. *See* **TREATMENT.**

COAL. *See* **PUMPING.**

COLLECTING WATER RATES.
See **ACCOUNTING and RATES.**

COMPENSATING RESERVOIRS.
See **DAMAGES.**

COMPLAINTS. *See* **MANAGEMENT.**

CONCRETE. *See* **MATERIALS.**

CONCRETE PIPE. *See* **PIPE.**

CONDUITS AND TUNNELS.
Catskill Aqueduct, New York, N. Y.:
City tunnel and conduits. (W. E. Spear.) XXVII 315 (1913).
Hudson River crossing. (Robert Ridgeway.) XXV 317 (1911).
Old aqueduct, Haverhill, Mass. (A. L. Sawyer.) XXII 442 (1908).
Risks taken by a municipality in having but one supply main. (J. C. Hancock.) VI 59 (1891–92).
Scituate Aqueduct, Providence, R. I.:
Aqueduct in open cut. (T. T. Allard.) XL 546 (1926).
Tunnel. (R. R. Bradbury.) XL 535 (1926).
Sebago Lake conduit, Portland, Me. (H. U. Fuller, L. Metcalf and C. B. Mitchell.) XXXIX 394 (1925).
Shepaug Tunnel, Waterbury, Conn. (R. A. Cairns.) XLIII 258 (1929).
Troubles in tunnel and subway construction, Boston, Mass. (F. I. Winslow.) XXVI 328 (1912).
Visit to new Croton Aqueduct. (Desmond FitzGerald.) III 161 (1888–89).
See also **PIPE.**

CONNECTIONS, PIPE. *See* **PIPE JOINTS.**

CONSERVATION OF WATER.
See **LAWS and SUPPLY.**

CONSUMPTION.
Forms for water-consumption statistics. (Committee report.) XXXI 481 (1917).
How to reduce excessive water consumption. (J. C. Haskell.) IX 231 (1894–95).
Meters and water consumption. (W. S. Johnson.) XXI 109 (1907); XXVI 40 (1912).
Municipal use of water. (John Venner.) XVII 268 (1903).
Requisite amount of water for a public supply. (J. H. Shedd.) XVIII 1 (1904).
Results of meterage:
Atlantic City, N. J. (W. C. Hawley.) XII 111 (1897–98).
Boston, Mass., Metropolitan. (S. E. Killam.) XXXI 495 (1917).
Brookline, Mass. (F. F. Forbes.) XX 247 (1906).
Hartford, Conn. (E. M. Peck.) XXII 282 (1908).
Larger cities of the United States. XV 351 (1900–01).
Safe ratio of pumping capacity to maximum consumption. (W. B. Sherman.) III 90, 104 (1888–89).
Water consumption. (C. W. Sherman.) XXXVI 273 (1922).
Water consumption:
Boston, Mass., Metropolitan. (Dexter Brackett.) XVIII 107 (1904).
Milton, Mass. (D. A. Heffernan.) XXVIII 290 (1914).
Water-consumption statistics. (W. B. Sherman.) II March 35 (1887–88); (Committee report.) XV 352 (1900–01); XVIII 115 (1904); XXI 112 (1907); XXV 66 (1911); XXVII 29 (1913); (E. S. Cole.) XXV 66 (1911).
Water uses difficult to control. (W. F. Sullivan.) XXVIII 377 (1914).
See also **STATISTICS, SUPPLY and WASTE.**

CONTROL OF WATER QUALITY.
See **QUALITY and LAWS.**

COPPER AND HEALTH. *See* **HEALTH.**

COPPER PIPE. *See* **PIPE (SERVICE).**

COPPER SULPHATE TREATMENT.
See **TREATMENT.**

CORPORATION COCKS.
See **PIPE (SERVICE).**

CORROSION AND ELECTROLYSIS.
Action of water on metal. (D. A. Heffernan.) XXXV 123 (1921).
Action of water on pipes. (Freeland Howe, Jr.) XXII 43 (1908).
Coolgardie pipe line, Australia, and correction of corrosion. (F. F. Longley.) XXXIX 421 (1925).
Corrosion in water-works engineering. (F. N. Speller.) XXXIX 90 (1925).
Corrosion of iron and steel pipes and standpipes. (Committee report.) XLIII 358 (1929).
Corrosion of 36-in. steel force main, Akron, O. (G. G. Dixon.) XXXVI 157 (1922).
Corrosive action of water on metals. (R. S. Weston.) XXIV 559 (1910).
Electrolysis of pipes, Lynn, Mass. (J. C. Haskell.) X 278 (1895–96).
Electrolysis of steel force main, Akron, O. (V. B. Phillips.) XXXVI 170 (1922).
Electrolysis of water pipes. (C. H. Morse.) VII 139 (1892–93); (C. A. Stone and H. C. Forbes.) IX 25 (1894–95); (H. S. Storrs.) X 33 (1895–96); (E. E. Brownell.) XIV 363 (1899–1900); (F. A. W. Davis.) XV 225 (1900–01); (A. A. Knudson.) XV 244 (1900–01); (Discussion.) XX 34 (1906); (E. B. Rosa.) XXIX 49 (1915); (A. F. Ganz.) XXXI 280 (1917); (C. F. Meyerherm.) XLIII 143 (1929).
Filling of service pipes by sediment of tuberculation. (Discussion.) VIII 105 (1893–94).
Grounding electric-light wires on water pipes. (F. E. Merrill.) XXIII 180 (1909).
Lead-covered cables a cause of electrolysis of water and gas pipes. (A. A. Knudson.) XXIII 164 (1909).
Monel metal for water-works uses. (H. S. Arnold.) XXXVI 86 (1922).
Prevention of red-water plague. (W. H. Walker.) XXXIV 33 (1920).
Relative corrosion and constitution of iron and steel pipe. (W. H. Walker.) XXVI 7 (1912).
Soil-corrosion effects upon piping. Tests of U. S. Bureau of Standards. (J. D. Capron.) XLI 81 (1927).
Tubercles in iron and steel penstocks. (R. A. Hale.) X 244 (1895–96).
Tuberculation of cast-iron pipe. (C. W. Sherman.) XLII 259 (1928).
See also **PIPES, QUALITY and STANDPIPES.**

CROSS-CONNECTIONS.
See **DISTRIBUTION.**

CURB BOXES. *See* **PIPE (SERVICE).**

DAMAGES.
Adjustment of diversion damages by storage compensation. (R. E. Horton.) XXII 334 (1908).
Awards for water and water-power diversion. (Committee report.) XXIV 1 (1910).
Compensating reservoirs and diversion of water. (C. M. Saville.) XL 352 (1926).
Damages by diversion of water power. (Clemens Herschel.) XXI 241 (1907).
Damages to mill powers, Troy, N. Y. (W. G. Raymond.) XIII 152 (1898–99).
Loss of water power by diversion. (L. M. Hastings.) VII 187 (1892–93).
Real estate and damage settlements, Scituate Reservoir, Providence, R. I. (E. C. Craig.) XL 503 (1926).
Values of water powers and damages caused by the diversion of water. (C. T. Main.) XXI 214 (1907).
See also **LAWS.**

DAMS.
Arched masonry dam, Las Vegas, N. M. (W. T. Barnes.) XXVI 356 (1912).
Construction and failure of Austin, Pa., dam. (T. C. Hatton.) XXVI 262 (1912).
Construction of dams. (A. E. Walden.) XXVIII 268 (1914).
Core wall, Wanaque Dam, N. J. (A. H. Pratt.) XXXVI 457 (1922).
Dam at Quincy, Mass. (L. A. Taylor.) III 167 (1888–89).
Dams in Japan. (Allen Hazen.) LXIV 451 (1930).
Design of diversion conduit and waste works, Richards Corner Dam, New Hartford, Conn. (R. E. Wise.) XXXI 595 (1917).
Echo Lake Dam, Milford, Mass. (Leonard Metcalf.) XVII 146 (1903).
Engineering construction by the United States Reclamation Service. (M. O. Leighton.) XX 127 (1906).
Granville Dam, Westfield, Mass.:
Construction. (E. B. Myott.) XLIII 175 (1929).
Design. (C. A. Farwell.) XLIII 164 (1929).
Soil studies. (Charles Terzaghi.) XLIII 191 (1929).
Grouting and preparing foundation of Scituate Dam, Providence, R. I. (J. V. Turner.) XL 517 (1926).
Grouting rock foundations, Hartford, Conn., dams. (J. E. Garratt.) XXXI 609 (1917).
Hollow concrete dams. (C. H. Eglee.) XXII 20 (1908).
Hydraulic fill dams, Miami Conservancy District, O. (H. S. R. McCurdy.) XXXIII 389 (1919).
Nepsag Dam, Hartford, Conn. (H. W. Griswold.) XXXI 603 (1917).
New Haven Water Company's dam, Woodbridge, Conn. (L. A. Taylor.) VI 51 (1891–92).
Phelps Brook Dam, Hartford, Conn. (J. F. Shaughnessy.) XXXII 39 (1918).
Sand-embankment dam, Chicopee, Mass. (M. G. Mansfield.) XLI 244 (1927).
Scituate Dam, Providence, R. I. (F. B. Marsh.) XL 477 (1926.)
State control of design and construction of dams and reservoirs. (C. E. Chandler.) XXVI 173 (1912).
State supervision of dams and reservoirs. (F. P. McKibben.) XXVI 242 (1912).
Temporary dam of wood and sandbags, New Bedford, Mass. (R. C. P. Coggeshall.) III 200 (1888–89).
Woonsocket reservoir and dam, Smithfield, R. I. (B. I. Cook.) XII 20 (1897–98).
See also **RESERVOIRS (IMPOUNDING).**

DEFERRIZATION AND DEMANGANIZATION.
See **TREATMENT (IRON REMOVAL).**

DEPRECIATION.
See **ACCOUNTS and VALUATION.**

DEPTH OF PIPE LAYING. *See* **PIPE.**

DIESEL ENGINES. *See* **PUMPING.**

DIKES. *See* **DAMS and RESERVOIRS.**

DISCHARGE MEASUREMENT.
See **HYDRAULICS.**

DISEASES, WATER-BORNE. *See* **HEALTH.**

DISINFECTION.
See **TREATMENT (DISINFECTION).**

DISTRIBUTION.
Cross-connections. (Committee report.) XLII 191, 461 (1928); XLIII 79 (1929).
Cross-connections in Connecticut. (W. J. Scott.) XLI 365 (1927).
Design of distribution systems. (G. S. Williams.) XIV 97 (1899–1900); (V. B. Siems and D. B. Biser.) XLIII 284 (1929).

DISTRIBUTION.—(*Continued*).
Distribution and maintenance, Providence, R. I. (S. F. Nolan.) XL 460 (1926).
Distribution problems. (F. B. Nelson.) XLIII 133 (1929).
Distribution system:
Malden, Mass. (S. M. Allis.) V 164 (1890–91); Hartford, Conn. (Frank Brainard.) XXXI 581 (1917).
Experiences in Hartford, Conn. (C. M. Saville.) XXX 195 (1916).
High-service system, New London, Conn. (W. H. Richards.) VII 148 (1892–93).
Some things that should be done in constructing water works. (W. R. Hill.) XIII 36 (1898–99).
Study and extension of distribution systems. (L. C. Hough.) XLI 14 (1927).
Testing distribution systems. (F. L. Fuller.) XI 330 (1896–97).
See also **FIRES, HYDRANTS, HYDRAULICS, MANAGEMENT, PIPE and SUPPLY.**

DIVERSION OF WATER.
See **DAMAGES and LAWS.**

DIVERSION CONDUITS.
See **DAMS and RESERVOIRS.**

DRINKING FOUNTAINS. *See* **FOUNTAINS.**

DUTY. *See* **PUMPING.**

DYSENTERY. *See* **HEALTH.**

EARTH DAMS. *See* **DAMS.**

EMBANKMENTS.
See **DAMS and RESERVOIRS.**

ELECTROLYSIS. *See* **CORROSION.**

ELEVATED TANKS. *See* **STANDPIPES.**

ELEVATION GAGES. *See* **GAGES.**

EMERGENCY SUPPLY. *See* **SUPPLY.**

ENGINES. *See* **PUMPING.**

EPIDEMICS, WATER-BORNE. *See* **HEALTH.**

EQUIPMENT. *See* **MATERIALS.**

EROSION.
See **GEOLOGY and WATERSHEDS.**

EVAPORATION. *See* **HYDROLOGY.**

EXCAVATION and BACKFILLING.
Are trenching machines worth considering in excavating trenches in city streets? (Discussion.) XXVIII 76 (1914).
Back-filling trenches. (E. A. W. Hammatt.) XII 160 (1897–98); (E. H. Gowing.) XII 173 (1897–98).
Excavating in quicksand. (A. F. Noyes.) IV 218 (1889–90).
Experiences with a trenching machine, Worcester, Mass. (G. W. Batchelder.) XXXI 486 (1917); XXXIV 315 (1920).
Macadam road thawed with steam. (E. B. Weston.) XIII 90 (1898–99).
Portable platform to aid in excavating trenches. (R. C. P. Coggeshall.) IX 125 (1894–95).
Quicksand — its nature, behavior and control. (C. R. Gow.) XXXIV 171 (1920).
Water-pipe trenches *vs.* good roads. (W. E. McClintock.) VIII 71 (1893–94).
See also **PIPE.**

EXPENSES. *See* **MANAGEMENT.**

EXPERIENCES, GENERAL.
See **MANAGEMENT and SUPPLY.**

EXTENSION OF PIPES.
See **DISTRIBUTION, MANAGEMENT, PIPE and RATES.**

FENCING WATERSHEDS.
See **WATERSHEDS.**

FILTER SAND. *See* **TREATMENT.**

FILTRATION. *See* **TREATMENT.**

FINANCING. *See* **MANAGEMENT and RATES.**

FIRES, AND FIRE PREVENTION AND PROTECTION.
Arrangement of hydrants and water pipes for protection of a city against fire. (J. R. Freeman.) VII 49, 152 (1892–93).
Automatic sprinkler regulations. XV 103 (1900–01).
Desirable pressure at hydrants. (E. V. French.) XXV 247 (1911).
Eliminating the conflagration hazard. (E. U. Crosby.) XV 97 (1900–01).
Experiments and practical tables relating to fire streams. (J. R. Freeman.) IV 95 (1889–90).
Field-engineering service of National Fire Protection Association. (F. H. Wentworth.) XLI 428 (1927).
Fighting fires beforehand. (C. W. Mowry.) XLI 413 (1927).
Fire in office and shop of Fairhaven Water Company. (H. T. Gidley.) XL 29 (1926).
Fire protection by direct high-pressure from pumps. (G. A. Ellis.) VII 27 (1892–93).
Fire protection for manufacturing establishments. (Discussion.) VII 176 (1892–93).
Grading water works with reference to fire protection. (Committee report.) XXX 513 (1916); XXXI 6 (1917); XXXIII 372 (1919).
Handling fires while changing distribution mains. (G. F. Chace.) X 230 (1895–96).
High-pressure fire systems:
Atlantic City, N. J. (L. Van Gilder.) XXXIV 146 (1920).
Boston, Mass. (F. A. McInnes.) XXXVI 483 (1922); (E. E. Williamson.) XLI 194 (1927).
Providence, R. I. (E. B. Weston.) XIII 85 (1898–99).
High-pressure fire systems from the underwriter's viewpoint. (G. W. Booth.) XXXVI 495 (1922).
Insurance rates and the water service. (F. A. Barbour.) XXII 322 (1908).
Loss of pressure caused by meters in fire supplies. (E. V. French.) XII 73 (1897–98).
Private fire protection. (Committee report.) XVI 290, 315 (1902); XVII 425 (1903); XVIII 198 (1904); XX 17 (1906).
Private fire protection and insurance rules. (Gorham Dana.) XXII 465 (1908).
Reasonable requirements for fire protection imposed upon water-works systems. (Clarence Goldsmith.) XXVI 305 (1912).
Recommendations of National Board of Fire Underwriters for improvements in fire department and water supply, Manchester, N. H. XIX 115 (1905).
Relation of water-works engineers to fire service of factories. (Edward Atkinson.) XVII 58 (1903).
Salem fire. (F. A. McInnes and Clarence Goldsmith.) XXIX 94 (1915).
Salt-water fire system, Boston, Mass. (F. A. McInnes.) XIII 304 (1898–99).
Standard schedule for grading cities and towns with reference to fire defenses and physical conditions. (J. S. Caldwell.) XXXV 1 (1921).
Tests of capacity of steam fire-engines, hydrants, and hose, Boston, Mass. (Dexter Brackett.) IX 151 (1894–95).
Tests of fire-service devices, Lowell, Mass. (W. F. Sullivan.) XIX 264 (1905).
Use and discard of auxiliary fire protection from a polluted source. (C. M. Saville.) XXXVI 392 (1922).

FIRES, AND FIRE PREVENTION AND PROTECTION.—(*Continued*).
Water service and fire protection of theaters. (W. P. Gerhard.) IX 77 (1894–95).
Water supply at Boston fire, Nov. 23, 1889. (Dexter Brackett.) IV 182 (1889–90).
Water supply at fires. (J. C. Haskell.) VII 47 (1892–93).
Weight of main pipe for fire supply. (Discussion.) V 18 (1890–91).
What a water-supply engineer can do in the fire department. (J. E. Tryon.) IX 93 (1894–95).
See also **ACCOUNTING, DISTRIBUTION, HOSE, HYDRANTS, METERS and RATES.**

FISH.
Eels in water works and their control. (G. W. Field.) XV 390 (1900–01).
See also **QUALITY.**

FLANGES. *See* **PIPE and SPECIFICATIONS.**

FLIES. *See* **HEALTH.**

FLOODS. *See* **HYDROLOGY.**

FLOW OF WATER. *See* **HYDRAULICS.**

FLUSHING. *See* **PIPE CLEANING.**

FORESTATION. *See* **WATERSHEDS.**

FOUNDATIONS. *See* **DAMS.**

FOUNTAINS.
Drinking fountains. (W. L. Faxon.) V 111 (1890–91).
Public watering stations. (F. E. Merrill.) XXVIII 357 (1914).

FREEZING. *See* **HYDRANTS, ICE and PIPE.**

FRICTION LOSSES. *See* **HYDRAULICS.**

FROST PROTECTION.
See **HYDRANTS, ICE and PIPE.**

FUEL. *See* **PUMPING.**

GAGES.
Air in pressure gages. (G. E. Winslow.) IX 248 (1894–95).
High-water alarm for reservoirs. (W. P. Whittemore.) III 21 (1888–89).
Recording gages. (J. A. Gould.) V 65 (1890–91).
Recording pressure gages. (F. G. Perry.) X 255 (1895–96).

GATES AND VALVES.
Care of gates and hydrants. (Patrick Gear.) XXVIII 298 (1914).
Effect of small gate or valve in larger pipe line. (T. E. Lally.) XXXIV 302 (1920).
Electrically-operated gates. (Discussion.) XXXVII 101 (1923).
Electrically-operated valves and distant control. (Alfred Williamson.) XXIX 507 (1915).
Electrification of gate valves. (Payne Dean.) XXXVI 264 (1922).
Experience with a 30-in. gate. (H. S. Nevons.) IV 212 (1889–90).
Gate plan. 74 (Trans. 1885).
Locating gates. (Discussion.) III 13 (1888–89).
Manganese bronze for valve stems. (W. R. Conard.) XXXVI 32 (1922).
Packing gates. (Discussion.) 92 (Trans. 1885), I Sept. 71 (1886).
Reasons for adopting solid-wedge valve, Boston, Mass. (G. H. Finneran.) XXX 101 (1916).
Reasons for using double-disk valve. (J. M. Diven.) XXX 106 (1916).
Relief or safety valves in distribution systems. (S. E. Babcock.) III 57 (1888–89).
Water-pressure regulators. (A. O. Doane.) XX 1 (1906).
See also **PIPE and SPECIFICATIONS.**

GEOLOGY.
Erosion on the Pacific slope. (S. M. Allis.) III 158 (1888–89).
See also **GROUND WATER and WATERSHEDS.**

GREAT PONDS. *See* **SUPPLY.**

GROUND WATER.
Artesian well experiment, Taunton, Mass. (G. F. Chace.) IV 221 (1889–90).
Can tests by tubular wells be relied upon to show amount of water available for a public water supply? (W. C. Boyce.) III 27 (1888–89).
Driven wells. (Discussion.) I Sept. 79 (1886–87).
Driven wells as a source of water supply. (A. F. Noyes.) I June 19 (1886–87); (F. F. Forbes.) V 141 (1890–91).
Driven wells:
Bretton Woods, N. H. (W. P. Gerhard.) XVIII 247 (1904).
Brookline, Mass. (F. F. Forbes.) XI 195 (1896–97).
Lowell, Mass. (George Bowers.) IX 66 (1894–95); X 226 (1895–96); XIII 30 (1898–99).
Ground waters as sources of public water supply. (W. S. Johnson.) XXIII 401 (1909).
Infiltration galleries, Des Moines, Iowa. (C. B. Burdick.) XXXVIII 203 (1924).
Quantitative estimation of ground waters for public supplies. (M. L. Fuller.) XXVII 233 (1913).
Soils from which water supplies may be drawn by filter galleries or driven wells. (Phineas Ball.) III 29 (1888–89).
Sub-surface collecting system and quality of water, Newton, Mass. (E. H. Rogers.) XXXVII 312 (1923).
Underground water: how to obtain it and care for it. (George Bowers.) XVII 127 (1903).
Utilizing a spring as a source of water supply for a town. (L. E. Hawes.) XI 156 (1896–97).
Well covering, Waltham, Mass. (F. P. Johnson.) VIII 120 (1893–94).
Well, Waltham, Mass. (F. L. Fuller.) VI 183 (1891–92).
See also **SUPPLY.**

GROUNDING OF ELECTRICAL LINES.
See **CORROSION.**

GROUTING AND GUNITING.
See **CONDUITS, DAMS and RESERVOIRS.**

HAMMER, WATER. *See* **HYDRAULICS.**

HEALTH.
Copper and health. (Wm. G. Schneider.) XLIV 485 (1930).
Drinking-water and disease. (W. P. Mason.) VI 139 (1891–92).
Flies and disease. (H. D. Pease.) XXV 17 (1911).
Gastro-enteritis, Peabody, Mass. October, 1913. (A. D. Weston.) XXXIV 193 (1920).
Lead poisoning by lead service-pipe. (F. F. Forbes.) XV 58 (1900–01).
Lead poisoning by water and its prevention. (R. S. Weston.) XXXIV 239 (1920); XXXV 126 (1921).
Longevity of typhoid bacillus. (G. A. Johnson.) XIX 506 (1905).
Massachusetts water supplies and the typhoid rate. (H. W. Clarke.) XXXIV 203 (1920).
Mortality rates of Philadelphia, Pa., in relation to the water supply. (J. O. Vogleson.) XXVIII 127 (1914).
Mosquitoes and their extermination. (W. L. Underwood.) XVIII 161 (1904).
Oysters a cause of typhoid fever, Washington, D. C. (W. T. Sedgwick.) XXV 470 (1911).
Poisonous effects of copper. (F. B. Mallory.) XLI 27 (1927).
Relation of improvements in water supplies to typhoid fever and other intestinal diseases. (C. A. Holmquist.) XXXVIII 237 (1924).
Relation of intensity of typhoid to character of water carriage. (W. P. Mason.) XIX 412 (1905).

HEALTH.—(*Continued*).
Relative responsibility of public water supplies and other factors for the causation of typhoid. (W. T. Sedgwick and C.-E. A. Winslow.) XX 51 (1906).
Typhoid epidemics:
Cleveland, O., 1903–04. (G. C. Whipple.) XX 266 (1906).
Ithaca, N. Y., 1903. (G. A. Soper.) XVIII 431 (1904).
Kennebec Valley, Me., 1902–03. (G. C. Whipple and E. C. Levy.) XIX 163 (1905).
Maidstone, England. (W. P. Mason.) XXIV 299 (1910).
Plymouth, Pa., 1885. (C. W. Sherman.) XLI 23 (1927).
Salem, O. (W. H. Dittoe.) XXXV 335 (1921); XXXVI 262 (1922).
Watertown, N. Y., 1904. (G. A. Soper.) XXII 87 (1908).
Typhoid fever and water supplies. (H. F. Mills). V 149 (1890–91).
Toxicology of copper used for water treatment. (H. E. Smith.) XIX 491 (1905).
Vital statistics, Cambridge, Mass. (L. M. Hastings.) XX 406 (1906).
Water-borne diseases. (Theobald Smith.) X 203 (1895–96).
Water supply, diarrheal diseases and infant mortality, Burlington, Vt., 1879–1905. (M. N. Baker.) XX 163 (1906).
See also **LAWS and QUALITY.**

HEATERS, HOT WATER. *See* **PLUMBING.**

HIGH WATER ALARMS. *See* **GAGES.**

HOSE.
Large and small fire hose, water pressures and hydrant spacings. (W. R. Conard.) XXXIX 79 (1925).
Vibration in hose, producing heat. (Discussion.) XXXV 42 (1921).
See also **FIRES, HYDRANTS, HYDRAULICS and SPECIFICATIONS.**

HOT WATER HEATERS. *See* **PLUMBING.**

HYDRANTS.
Care of hydrants. (Patrick Gear.) XXVIII 298 (1914.)
Control of hydrants. (Discussion.) X 143 (1895–96).
Hydrant connections for fire engines. (F. A. Marston.) XXXVII 369 (1923).
Hydrant experiments. (C. L. Newcomb.) XXI 378 (1907).
Hydrant outlets. (G. E. Winslow.) V 26 (1890–91).
Hydrants. (G. A. Stacy.) IV 32 (1889–90).
Hydrants broken by automobiles. (Discussion.) XXXIV 49 (1920).
Large and small fire hose, water pressures and hydrant spacings. (W. R. Conard.) XXXIX 79 (1925).
Proper size for hydrants. (Discussion.) II Sept. 94 (1887–88).
See also **FIRES, GATES, HOSE, ICE and SPECIFICATIONS.**

HYDRANT THAWING AND FROST PROTECTION. *See* **ICE.**

HYDRAULIC FILL DAMS. *See* **DAMS.**

HYDRAULICS.
Discharge of conduits supplying Mt. Hope Reservoir, Rochester, N. Y. (Emil Kuichling.) XIII 138 (1898–99).
Discharge of water mains as determined by the pressure gage. (G. A. Ellis.) I Sept. 19; Dec. 18 (1886–87).
Effect and remedy of water hammer on main pipes. (J. C. Hancock.) V 11 (1890–91).
Effect of water hammer on cement-lined pipe. (G. E. Winslow.) IV 191 (1889–90).

HYDRAULICS.—(*Continued*).
Eliminating water hammer from a high-pressure regulating valve. (S. L. Ruggles.) XXXVII 402 (1923).
Frictional head in a force-main. (F. F. Forbes.) VI 164 (1891–92).
Friction in pumping mains. (F. C. Coffin.) X 234 (1895–96).
Hydraulic laboratory, Cornell University. (E. A. Fuertes.) XIV 195 (1899–1900).
Hydraulic laboratory, Massachusetts Institute of Technology. (Dwight Porter.) VIII 81 (1893–94).
Hydraulic service characteristics of small metallic pipes. (G. M. Fair, M. C. Whipple and C. Y. Hsiao.) XLIV 499 (1930).
Loss of head in bends. (W. E. Fuller.) XXVII 509 (1913).
Measurements of flow of water in a 36-in. and 30-in. compound pipe. (L. M. Hastings.) VIII 189 (1893–94); IX 58 (1894–95).
Reducing water ram caused by direct-acting pumping engines. (G. E. Winslow.) XV 493 (1900–01).
Test of discharge of hose, Springfield, Mass., June 19, 1885. 152 (Trans. 1885).
Water hammer. (Discussion.) I Sept. 73 (1886–87); XXV 76 (1911).
Water hammer, caused by water in the air chamber of a pump. (E. E. Farnham.) VI 26 (1891–92).
Water hammer in house plumbing which does not include a tank. (A. F. Noyes.) 62 (Trans. 1885).
Water ram from hydraulic elevator. (C. W. Sherman.) XXVII 169 (1913).
Water ram in distribution system, Hartford, Conn. (C. M. Saville.) XXVII 183 (1913).

See also **MEASUREMENT OF WATER.**

HYDROLOGY.
Capacity of the Sudbury River and Lake Cochituate reservoirs in time of drought. (Desmond FitzGerald.) II Dec. 3 (1887–88).
Causes of rainfall. (W. M. Davis.) XV 338 (1900–01).
Determining mean precipitation on a drainage basin. (R. E. Horton.) XXXVIII 1 (1924).
Estimating stream flow in New England. (H. K. Barrows.) XIX 437 (1905).
Floods and droughts on New England streams. (C. M. Saville.) XXXIX 1 (1925).
Influence of forests upon rainfall and stream flow. (G. F. Swain.) I March 11 (1886–87).
Measurement of rainfall and snow. (R. E. Horton.) XXXIII 14 (1919).
New England rainstorm, Nov. 3–4, 1927. (C. F. Brooks and J. H. Weber.) XLII 91 (1928); XLIV 106 (1930); (X. H. Goodnough.) XLII 150 (1928); XLIV 119 (1930).
Rainfall, amount available for water supply. (Desmond FitzGerald.) I Sept. 41 (1886–87).
Rainfall and run-off from catchment areas, New England. (L. M. Hastings.) XVIII 32 (1904).
Rainfall and run-off measurements. (Committee report.) XXXV 151 (1921).
Rainfall and stream-flow measurements, Holyoke, Mass. (P. J. Lucey.) XXXIV 323 (1920).
Rainfall in New England. (X. H. Goodnough.) XXIX 237 (1915); XXXV 228, 397 (1921); XL 178 (1926); XLIV 157 (1930).
Rainfall of New England. (C. F. Brooks.) XLIV 1 (1930).
Rainfall of New England. (J. H. Weber.)
Historical statement. XLIV 6 (1930).
Annual rainfall. XLII 137 (1928); XLIV 19 (1930).
Seasonal rainfall. XLII 278 (1928); XLIV 32 (1930).
Mean monthly rainfall of southern New England. XLII 291 (1928); XLIV 45 (1930).
Minimum and maximum monthly rainfall of southern New England. XLII 414 (1928); XLIV 57 (1930).
Rainfall of northern New England. (Gragg Richards.) XLII 431 (1928); XLIII 50 (1929); XLIV 74, 100 (1930).

HYDROLOGY.—(*Continued*).
Secular and local variations of weather and climate affecting water supply. (W. H. Niles.) V 74 (1890–91).
Stream-flow data, 1875–1898, Sudbury, Nashua, and Merrimac rivers. (C. E. Chandler.) XXII 409 (1908).
Stream-flow data from a water-power standpoint. (C. E. Chandler.) XXI 464 (1907).
Uses of rainfall records. (L. M. Hastings.) XXXIII 72 (1919).
Watershed leakage in relation to gravity water supplies. (R. E. Horton.) XXXIII 306 (1919).
Yield of catchment areas. (Committee report.) XXVIII 397 (1914).

ICE AND ICE PROTECTION.
Anchor ice. (R. C. P. Coggeshall.) X 265 (1895–96).
Anchor ice and a recording pressure-gage affected by a clogged conduit. (C. W. S. Seymour.) IX 223 (1894–95).
Care of hydrants in winter. (G. I. Bailey.) XIV 116 (1899–1900).
Conditions in water-distribution systems during severe winter of 1917–18. (Committee report.) XXXII 267 (1918).
Electric thawing machine. (F. J. Gifford.) XXXIV 114 (1920).
Examination of hydrants in cold weather. (G. A. Stacy.) VII 222 (1892–93).
Freezing of house meters. (Discussion.) XVIII 65 (1904).
Freezing of hydrants. (Discussion.) II Sept. 12 (1887–88).
How to set hydrants to prevent freezing. (Discussion.) IV 9 (1889–90).
Ice formation. (H. S. Barnes.) XXIV 576 (1910).
Lime to thaw pipes. (C. K. Walker.) VII 220 (1892–93).
Naphtha lamp for thawing frozen pipe. (Discussion.) 103 (Trans. 1885).
Portable boiler for thawing frozen pipes. (C. K. Walker.) XVIII 217 (1904).
Protecting pipes from freezing. (Discussion.) XXII 36 (1908).
Protection of pipes from frost. (E. A. Jones.) III 125 (1888–89).
Thawing frozen service boxes and pipes. (Discussion.) XVIII 58 (1904).
Thawing frozen service pipes and distributing the cost. (Discussion.) XXVI 159 (1912).
Thawing frozen service pipes by electricity. (F. A. McInnes.) XVIII 214 (1904).
Thawing frozen services. (D. A. Heffernan.) XXXII 133 (1918).
Thawing hydrants. (Committee report.) XLI 79 (1927).
Thermit for relieving ice troubles. (H. T. Barnes.) XL 312 (1926).

See also **HYDRANTS and PIPE.**

INDUSTRIAL WASTES.
See **QUALITY and SEWAGE.**

INSTRUCTIONS TO EMPLOYEES.
See **MANAGEMENT.**

INSURANCE, FIRE. *See* **FIRES.**

INTAKES.
Little Quittacas intake, New Bedford, Mass. (F. A. Barbour.) XXXIX 370 (1925).
Sebago Lake intake, Portland, Me. (H. U. Fuller, L. Metcalf and C. B. Mitchell.) XXXIX 394 (1925).

See also **SUPPLY.**

IRON REMOVAL. *See* **TREATMENT.**

JOINTS AND JOINTING MATERIALS.
See **PIPE JOINTS.**

LABOR TROUBLES. *See* **MANAGEMENT.**

LABORATORIES, WATER-WORKS.

Design and equipment of water-works laboratories. (M. C. Whipple.) XLII 339 (1928).
Small water-works laboratory. (A. N. French.) XXXII 64 (1918).
See also **ANALYSIS, QUALITY and TREATMENT.**

LANDSCAPING. *See* **ARCHITECTURE.**

LAWS AND WATER RIGHTS.

Act relating to use of Little Quittacas Pond, New Bedford, Mass. I June 17 (1886–87).
Can a water taxpayer's application for water supply be refused? (Discussion.) I Sept. 32 (1886–87).
City of Dayton, O. *vs.* City Railway Co. XVI 151 (1902).
City's right to meter fire services. (City of Lowell, Mass. *vs.* Shaw Stocking Co.) XXII 279 (1908).
Control of public water supplies by the New York State Conservation Commission. (Russell Suter.) XXIX 520 (1915).
Control of service pipes. (Discussion.) II Sept. 19 (1887–88).
Control of water supplies of New York State and laws relating thereto. (C. A. Holmquist.) XLI 261 (1927).
Health laws relating to public water supplies. (A. D. Weston.) XXXVIII 333 (1924).
Interstate water rights. (C. M. Saville.) XLI 340 (1927).
Law governing the taking of private property. (Philips Nichols.) XXXVII 327 (1924).
Laws and regulations for the protection of public water supplies. (W. J. Scott.) XL 425 (1926).
Legal aspects of water-power development in Maine. (C. C. Babb.) XXVI 190 (1912).
Legality of supplying water to premises extending into two adjoining towns. (Discussion.) IX 197 (1894–95).
Legislation and court decisions for sanitary protection of water supplies. (Albert L. Sawyer.) XXXII 154 (1918).
Legislation and other activities relating to conservation. (Committee report.) XXIII 131 (1909); XXV 135 (1911); XXVIII 101 (1914).
Legislation for making water bills a lien upon property. (Discussion.) XXVII 522 (1913).
Legislative matters in Massachusetts. (Committee report.) XL 175 (1926).
Litigation, Newton, N. J. (L. L. Tribus.) XXIII 145 (1909).
Massachusetts laws on financing municipal water works. (Committee report.) XXXVII 105, 315 (1923).
Massachusetts law to protect inland waters. I March 6 (1886–87).
Operation of Massachusetts "water lien" law. XL 161 (1926).
Passage of Massachusetts statute making water bills a lien on real estate. (Committee report.) XXVIII 91, 105 (1914).
Principles governing riparian water rights and diversion suits. (C. F. Choate, Jr.) XXIV 187 (1910).
Public control over new streets in relation to extension of water mains. (Bertram Brewer.) XXXIII 436 (1919).
Public works and state boundaries. (Clemens Herschel.) XLI 331 (1927).
Status of application for water service to a property upon death of owner. (Discussion.) XXV 473 (1911).
Water rights. (R. A. Hale.) XXI 248 (1907).
See also **DAMAGES, HEALTH, MANAGEMENT and RATES.**

LAYING PIPE. *See* **PIPE.**

LEAD AND HEALTH. *See* **HEALTH.**

LEAKAGE AND LEAK DETECTION. *See* **WASTE.**

LIFE OF PIPE. *See* **PIPE.**

LINING PIPE. *See* **PIPE and PIPE LINING.**

MAINTENANCE. *See* **MANAGEMENT.**

MANAGEMENT.

Advisability of use of meters, and their ownership by the city. (Discussion.) VI 21 (1891–92).
Civil service and the water department. (J. C. Pelletier.) XXIII 209, 355 (1909).
Construction and maintenance of water works. (C. W. Kingsley.) III 127 (1888–89).
Control of street openings. (Discussion.) XXXVIII 130 (1924).
Coöperation of water-works operators with the public and employees. (F. T. Kemble.) XXXVI 363 (1922).
Difficulties in water-works management, Manchester, N. H. (C. K. Walker.) XI 341 (1896–97).
Distribution and maintenance, Providence, R. I. (S. F. Nolan.) XL 460 (1926).
Economic advantages of private ownership of water companies. (A. S. Dewing.) XLI 63 (1927).
Economy in water-works management. (S. M. Allis.) VI 161 (1891–92).
Economy of municipal bonds for water-works construction. (C. W. Sherman.) XL 15 (1926).
Efficiency in water-works management. (W. H. Richards.) XXV 407 (1911).
Emergency gang in a water service. (George H. Finneran.) XXX 413 (1916).
Engineering coöperation. (Committee report.) XXIX 591 (1915).
Experiences, Hartford, Conn. (C. M. Saville.) XXX 195 (1916).
Extension of the water district idea in Maine. (Harvey D. Eaton.) XXXI 196 (1917).
Extensions of water mains. (Committee report.) XXV 212 (1911).
Financial management of water works. (F. C. Coffin.) XI 63 (1896–97).
Financing municipal water-supply enterprises. (T. N. Waddell.) XXXVIII 321 (1924).
Inconvenience of deposit of a certified check with a proposal for an installation. (F. H. Hayes.) XXIX 143 (1915).
Instructions to employees at pumping stations and filter plants. (Dow R. Gwinn.) XXXIV 284 (1920).
Labor troubles. (Discussion.) XXXII 376 (1918).
Legal aspects of financial management of water works in Massachusetts. (A. D. Weston.) XLIII 328 (1929).
Merging water department with other municipal departments. (G. A. King.) XXXVI 434, 612 (1922).
Municipal management of water-supply systems. (J. H. Hall.) XVII 9, 338 (1903).
Municipal supply not for operating motors. (J. N. Tubbs.) VI 152 (1891–92).
Municipal water-works administration. (A. R. Hathaway.) XXXVII 88 (1923).
Municipal water-works financing in Massachusetts. (C. W. Sherman, H. A. Symonds and W. S. Johnson.) XXX 279 (1916).
Operating problems of a small water department. (Homer R. Turner.) XXXI 633 (1917).
Personal character in its relation to practical efficiency. (C. H. Eglee.) XXIX 214 (1915).
Practical talk on water-works matters. (G. H. Finneran.) XXXIV 272 (1920).
Precision. (W. B. Sherman.) XVII 52 (1903).
Prevention of theft of water from fire services. (Discussion.) XVI 290 (1902).
Private and public water works. (Discussion.) IV 17 (1889–90).
Reminiscences of a superintendent. (D. A. Hefferman.) XLII 235 (1928).
Revenue and operating expenses of municipally-owned water works, Massachusetts, 1913. (Charles W. Sherman.) XXX 260 (1916).
Selling from the manufacturers' and purchasers' viewpoint. (W. P. Mosteller.) XXXVIII 287 (1924).
Separate meters for each of two or more tenements in same house. (Discussion.) XXVII 296 (1913.)

MANAGEMENT.—(*Continued*).
Should fire services be metered? (Discussion.) VI 27 (1891–92); XI 342 (1896–97); XV 419 (1900–01).
Soft answer to complaints. (L. H. Gardner.) V 129 (1890–91).
Suggestions to water-works officials of benefit to the consumer. (D. A. Heffernan.) XXXIV 183 (1920).
Term for which water-works bonds should run. (C. W. Sherman.) XXXVI 589 (1922).
Use of a bond instead of certified check to accompany proposals. (Committee report.) XXXIV 225 (1920).
Water meters: advisability of their use. (G. A. Roullier.) V 56 (1890–91).
Water-works management. (Edwin Darling.) II Sept. 7 (1887–88).
Why municipal water works are not self-supporting. (Nathan Matthews.) IX 1 (1894–95).
See also **ACCOUNTING, LAWS, RATES SUPPLY and VALUATION.**

MANGANESE REMOVAL.
See **TREATMENT (IRON REMOVAL).**

MANHOLE FRAMES AND COVERS.
See **SPECIFICATIONS.**

MANUFACTURE OF PIPE. *See* **PIPE.**

MASONRY DAMS. *See* **DAMS.**

MATERIALS AND EQUIPMENT.
Automobile as an efficiency agent. (G. W. Batchelder.) XXVIII 281 (1914).
Automobile for business. (F. F. Forbes.) XXII 38 (1908).
Coöperation in use of equipment. (Discussion.) XXXIV 322 (1920).
Inspection of equipment. (T. E. Lally.) XXXVI 450, 613 (1922).
Testing and use of Portland and natural cements. (E. S. Larned.) XXI 1 (1907).
"Wells" light for night work. (E. P. Gardner.) VII 168 (1892–93).
See also **EXCAVATION, ICE and MANAGEMENT.**

MEASUREMENT OF WATER.
Installation and care of Venturi meters. (A. B. Coulters.) XLIII 281 (1929).
Measurement of water, Metropolitan Water Works, Boston, Mass. XVIII 107 (1904).
Pitometer and its uses. (E. M. Blake.) XX 152 (1906).
Pitot tube for water-flow and pressure studies. (H. B. Smith.) XLIV 471 (1930).
Venturi meter. (R. A. Robertson.) VII 32 (1892–93).
See also **CONSUMPTION, HYDRAULICS, METERS.**

METEOROLOGY. *See* **HYDROLOGY.**

METER RATES.
See **ACCOUNTING, CONSUMPTION and RATES.**

METERS, WATER.
Accuracy: of meters. (John Thomson.) VIII 58 (1893–94).
Care and maintenance of meters. (J. C. Whitney.) IX 106 (1894–95); (A. W. Cuddeback.) XXVII 471 (1913); (H. W. Griswold.) XLIII 273 (1929).
Experience with water meters. (H. G. Holden.) III 154 (1888–89); (L. A. Taylor.) VI 182 (1891–92).
Fire-service meters. (E. V. French.) XIX 291 (1905).
Luxuries of yesterday, necessities of today. (C. C. Behney.) XXXVIII 294 (1924).

METERS, WATER.—(*Continued*).
Metering, Boston, Mass. (J. A. McMurray.) XXIX 73 (1915).
Metering fire services. (F. E. Beck.) XXXIV 125 (1920).
Meter registration. (A. N. French.) XXI 33 (1907).
Meter setting and maintenance. (J. A. McMurray.) XXXVII 44 (1923).
Round multiple and straight-reading registers. (Discussion.) XXIV 370 (1910).
Selection of meters. (Caleb Mills Saville.) XXXII 329 (1918).
Service pipes and meters. (Discussion.) XLII 251 (1928).
Testing meters:
Best method. (Discussion.) II Sept. 93 (1887–88).
Boston, Mass. (L. F. Rice.) III 67, 120 (1888–89).
Curves of accuracy and friction loss. (F. B. Nelson.) XXIX 539 (1915).
Large meters. (R. E. Ferguson.) XLIII 382 (1929).
Lowell, Mass. (W. F. Sullivan.) XIX 264 (1905).
Six-inch. (F. C. Kimball.) XVII 305 (1903).
Uniformity of methods. (John Thomson.) X 78, 111 (1895–96).
Water meters. (L. A. Taylor.) I Sept. 57 (1886–87).
See also **CONSUMPTION, FIRES, MANAGEMENT, MEASUREMENT OF WATER and SPECIFICATIONS.**

MICROSCOPIC ORGANISMS.
See **QUALITY and WATER TREATMENT.**

MILITARY WATER SUPPLIES.
See **SUPPLY (MILITARY).**

MISCELLANEOUS.
Atlantic intra-coastal waterways. (Edward Parrish.) XXV 285 (1911).
From peace to war, from war to victory, from victory to just judgment. (W. T. Sedgwick.) XXXII 189 (1918).
Parks, Rochester, N. Y. (C. C. Laney.) XXIV 485 (1910).
Placing a bridge in position. (C. A. Allen.) III 197 (1888–89).
Placing the walking beam in the steamer *Puritan*. (W. M. Hawes.) III 163 (1888–89).
Quartermaster terminal, Boston, Mass. (C. R. Gow.) XXXII 362 (1918).
Squantum destroyer plant. (T. C. Atwood.) XXXIII 1 (1919).
Water in some of its higher relations. (D. N. Beach.) III 133 (1888–89).

MIXING OF CHEMICALS.
See **TREATMENT.**

MONEL METAL. *See* **CORROSION.**

MOTORS. *See* **POWER and PUMPING.**

NOZZLES. *See* **FIRES.**

OFFICE METHODS.
See **ACCOUNTING and MANAGEMENT.**

OPERATION.
See **MANAGEMENT, SUPPLY and TREATMENT.**

OZONE.
See **TREATMENT (DISINFECTION).**

PAINTING STANDPIPES. *See* **STANDPIPES.**

PHYSICS OF WATER.
See **ANALYSIS and QUALITY.**

PIPE — GENERAL.

Accident on tile conduit. (W. H. Richards.) III 164 (1888–89).
Air in gravity mains. (J. W. Ledoux.) XXXV 31 (1921).
Depth of laying pipes. (Committee report.) XXII 368 (1908); XXIII 435 (1909); XXVII 160 (1913).
Economy in pipe lines for small water works. (E. D. Eldredge.) XXXIV 91 (1920).
Laying mains:
10-in. pipe, Leicester, Mass. (F. L. Fuller.) IV 190 (1889–90).
20-in. pipe, New London, Conn. (W. H. Richards.) IV 178 (1889–90).
30-in. supply main, Lowell, Mass. (S. P. Griffin.) VI 186 (1891–92).
Laying water pipes in congested streets, New York, N. Y. (Max Blatt.) XXIX 513 (1915).
Mains. (Discussion.) XXXII 46 (1918).
Minimum size of mains allowable. (Discussion.) VI 18 (1891–92).
Moving a conduit in 100-ft. sections. (W. E. Davis.) V 125 (1890–91).
Oxy-acetylene process in the piping field. (R. W. Boggs.) XLIII 44 (1929).
Pipes and pipe laying, Metropolitan Water Works, Boston, Mass. (C. M. Saville.) XVII 203 (1903).
Protection of water pipes and appurtenances in exposed locations. (Discussion.) XXXIX 174 (1925).
Raising or lowering large water pipes. (Dexter Brackett.) III 198 (1888–89).
Raising pipes in the trench. (J. E. Beals.) XX 244 (1906).
Siphon operation on main supply pipe. (W. R. Brann and C. W. Sherman.) XXXV 36 (1921).
Sixteen-in. direct river pipe, and its effect upon the Taunton, Mass., supply. (G. F. Chace.) VI 179 (1891–92).
Street mains: relative merits of different kinds. (F. E. Hall.) 107 (Trans. 1885).
Substitution of machinery for hand labor in pipe-laying. (S. H. Taylor.) XXXIX 445 (1925).
Thickness of large pipe lines. (Allen Hazen.) XXV 29 (1911.)
Thickness of main pipes. (Discussion.) IV 179 (1889–90).
Water pipes, Metropolitan Water Works, Boston, Mass. (Dexter Brackett.) XIII 325 (1898–99).
Water-supply mains. (J. W. Ledoux.) XXXV 354 (1921).
See also **CONDUITS, DISTRIBUTION, EXCAVATION, HYDRAULICS and MANAGEMENT.**

PIPE — CAST-IRON AND SPECIAL CASTINGS.

Bending 10-in. cast-iron pipe. (C. W. Sherman.) XXVII 27 (1913).
Casting pipe with the bell end down. (Discussion.) VII 18 (1892–93).
Cast-iron pipe. (Committee report.) I Sept. 12 (1886–87).
Cast-iron Pipe Publicity Bureau. (T. F. Wolfe). XL 345 (1926).
Cement-lined cast-iron pipe. (C. W. Sherman.) XL 98 (1926).
Cement-lined pipes. (Committee report.) XLII 492 (1928).
Engineering aspects of cast iron. (R. Moldenke.) XXXVII 1 (1923).
Life of cast-iron pipe. (C. Cavallier.) XVIII 218 (1904).
Making cast-iron pipe. (Jesse Garrett.) XI 27 (1896–97).
Manufacture and inspection of cast-iron pipe. (W. R. Conard.) XXXV 205 (1921).
Manufacture and use of small cast-iron pipe. (J. R. McWane.) XLIV 495 (1930).
Pipe castings. (Discussion.) VIII 78 (1893–94).
Sandspun pipe. (C. R. Wood.) XXXIX 85 (1925).
Thickness of cast-iron pipe. (N. H. Crafts.) III 175 (1888–89).
Turned joint on cast-iron pipe, Yarmouth, N. S. (F. C. Coffin.) XV 38 (1900–01).
"Universal" cast-iron pipe. (Discussion.) XXI 50 (1907); (J. H. Walsh.) XXXI 490 (1917).

PIPE — CAST-IRON AND SPECIAL CASTINGS.—(*Continued*).

Use and weight of special castings. (Discussion.) III 8 (1888–89).
Weight of cast-iron pipe. (A. F. Noyes.) 28, 154 (Trans. 1885).
See also **SPECIFICATIONS.**

PIPE — CEMENT.

Cement pipe. (P. F. Crilly.) V 50 (1890–91).
Construction of cement-lined pipe. (F. W. Gow.) 113 (Trans. 1885).
Wrought-iron, cement-lined water pipe. (Leonard Metcalf.) XXIII 1 (1909).

PIPE — CONCRETE.

Concrete pipe for water mains. (R. W. Mitchell.) XLIII 18 (1929).
Reinforced concrete pipe. (G. C. Bartram.) XXXIV 312 (1920).
Reinforced concrete pipe for water-supply lines. (W. G. Chase.) XXXVI 102 (1922).
Reinforced concrete pipe for water-supply lines under pressure. (F. F. Longley.) XXXVIII 257 (1924).

PIPE — RIVER AND SUBMARINE CROSSINGS.

Crossing a stream with a main pipe. (E. H. Gowing.) V 135 (1890–91).
Laying a 16-in. main across a rocky mill stream and over a dam. (G. F. Chace.) IX 103 (1894–95).
Laying a 24-in. main under the Nashua River, Nashua, N. H. (H. G. Holden.) XII 254 (1897–98).
Laying siphon under Broad Canal, Cambridge, Mass. (J. L. Harrington.) VII 90 (1892–93).
Placing a 10-in. high-service pipe across a river. (F. W. Gow.) XII 195 (1897–98).
Subaqueous pipe and electric cable way, Gloucester, Mass. (H. W. Spooner.) XXII 261 (1908).
Submarine pipe-line, Portland and Great Diamond Island, Me. (Harry U. Fuller.) XLIV 479 (1930).
Submarine pipe-line, Portland and South Portland, Me. (H. U. Fuller.) XXXVII 298 (1923).
Submerged 54-in. pipe, Skaneateles Lake, Syracuse, N. Y. (W. R. Hill.) VIII 40 (1893–94).

PIPE — SERVICE.

Are lead connections for iron service pipe necessary? (H. G. Holden.) VI 81 (1891–92).
Brass pipe for services. (Discussion.) XXXVII 428 (1923).
Cast-iron service pipe. (J. R. McWane.) XXXVIII 79 (1924).
Cement-lined service pipes. (F. F. Forbes.) XV 48 (1900–01).
Copper and brass water services. (W. G. Schneider.) XLIII 148 (1929).
Curb box. (H. G. Holden.) I Sept. 41 (1886–87).
Economy of service-pipe installation. (R. J. Newsom.) XXXVI 79 (1922).
Life of tarred service pipes. (F. L. Fuller.) VII 221 (1892–93).
Magnetic dipping needle for locating service and gate boxes. (E. D. Eldredge.) XXVIII 294 (1914).
Merits of lead service pipes. (Discussion.) VI 22 (1891–92); XII 51 (1897–98).
Screw cock injured by sand blast. (J. L. Harrington.) III 166 (1888–89).
Service boxes, Montreal, Que. (T. W. Lesage.) XVII 284 (1903).
Service gate boxes. (G. A. Stacy.) XI 339 (1896–97); XII 36 (1897–98).
Service pipe. (W. H. Richards.) 40 (Trans. 1884).
Service pipe. (Committee report.) XXXI 323 (1917).
Service pipes and meters. (Discussion.) XLII 251 (1928).
Service pipes and plumbing appliances. (D. A. Hefferman.) XXXVII 47 (1923).
Service-pipe defects and their remedy. (G. F. Chace.) XII 41 (1897–98).
See also **SPECIFICATIONS.**

PIPE — STEEL AND WROUGHT IRON.
Hole bored through wrought-iron sleeve. (Phineas Ball.) III 158 (1888–89).
Jackets for protection of steel pipes in Catskill Aqueduct, New York, N. Y. (A. D. Flinn.) XXV 345 (1911).
Repairs on a wrought-iron pipe main. (J. A. Tilden.) III 202 (1888–89).
Replacing castings and forgings by steel elements cut to shape by automatic shape-cutting machines. (Adolf Kreba.) XLII 36 (1928).
Steel for water mains. (L. M. Hastings.) XIII 314 (1898–99).
Steel pipes for water works. (Emil Kuichling.) XXIV 514 (1910).
See also **PIPE (CEMENT) and SPECIFICATIONS.**

PIPE — WOOD.
Early log pipe, Boston, Mass. (C. W. Sherman.) XLI 216 (1927).
Stave pipe — its economic design and use. (A. L. Adams.) XIII 247 (1898–99).
Wood pipe in New Hampshire. (Arthur W. Dudley.) XXX 318 (1916).
Wood-stave conduit, Atlantic City, N. J. (Kenneth Allen.) XVIII 375 (1904); (C. J. Meyers.) XVIII 387 (1904).
"Wyckoff" water pipe. (G. L. Wells.) XIII 288 (1898–99).

PIPE CLEANING AND DISINFECTION.
Care of mains in relation to the quality of the water supply. (G. F. Chace.) V 131 (1890–91).
Cleaning water mains:
(Discussion.) XXIV 373 (1910).
Hartford, Conn. (with specifications.) (C. M. Saville.) XXVII 489 (1913).
St. John, N. B. (William Murdoch.) XIII 147, 333 (1898–99).
Disinfection of water mains. (Committee report.) XLIV 565 (1930).
Flushing street mains. (J. H. Brown.) 70 (Trans. 1885).
Force pump for cleaning service pipes. (Discussion.) XXVIII 70 (1914).
Results of pipe cleaning. (B. B. Hodgman.) XXXIX 171 (1925).
See also **SPECIFICATIONS.**

PIPE CORROSION AND ELECTROLYSIS.
See **CORROSION.**

PIPE EXTENSIONS.
See **DISTRIBUTION, MANAGEMENT and RATES.**

PIPE JOINTS AND CONNECTIONS.
Calking joints with an air compressor. (D. J. Higgins.) XXVIII 286 (1914).
Cast-iron bell-and-spigot pipe joints, Boston, Mass. (Clarence Goldsmith.) XXVIII 113 (1914).
Cement for water-pipe joints. (William Wheeler.) XXXVII 62 (1923).
Connecting lead services. (W. F. Codd.) IX 187 (1894–95).
Costs of lead substitutes for pipe joints. (V. F. West.) XXXVII 75 (1923).
Depth of lead joints. (Discussion.) 94 (Trans. 1885); V 25 (1890–91).
Disjointing pipe without burning joints. (Discussion.) 102 (Trans. 1885).
Efficiency of pipe-jointing compounds, compared with lead. (F. O. Stevens.) XXXIV 102 (1920).
Insulation of joints in pipe lines. (W. R. Conard.) XXVII 228 (1913).
Leadite joints. (H. A. Symonds.) XXIX 557 (1915); (W. C. Hawley.) XXIX 563 (1915).
Matheson-joint steel water mains. (F. N. Speller.) XXXII 58 (1918).
Metallurgy of welding-wire. (C. A. McCune.) XLII 33 (1928).
Naphtha lamp for melting joints. (Discussion.) 103 (Trans. 1887).

PIPE JOINTS AND CONNECTIONS. — (*Continued*).
Pipe jointing compounds. (Discussion.) XXXVI 111, 309 (1922); (G. H. Finneran.) XXXVII 84 (1923).
Pipe-line welding by oxy-acetylene gas. (LeRoy Edwards.) XLII 3 (1928).
Pipe welding. (D. H. Deyoe.) XLII 25 (1928).
Rubber pipe joints. (R. S. Weston.) XXII 310 (1908).
Tapping band on cast-iron pipe for large connections. (L. A. Taylor.) IX 229 (1894–95).
Thermit pipe-welding. (R. L. Browne.) XLII 21 (1928).
Welding. (Discussion.) XLII 42 (1928).
Wiped and cup joints. (Discussion.) I Sept. 71 (1886–87).
Wooden joints in cast-iron mains. (William Murdoch.) XV 34 (1900–01).
Wooden plug used to stop the hole drilled by a "Smith" tapping machine. (Discussion.) XXIII 451 (1909).

PIPE LAYING.
See **EXCAVATION, PIPE (GENERAL) and PIPE JOINTS.**

PIPE LINING AND COATING.
Cement-lined pipe. (Committee report.) XLII 492 (1928).
Difficulty of obtaining pipe with a good coating. (Discussion.) X 143 (1895–96).
Disappearance of the coating from cast-iron pipe while stored in the yard. (S. E. Killam.) XXXV 367 (1921).
Linings and covering for water pipes. (Benjamin Talbot.) XL 446 (1926).
Pipe coatings. (Discussion.) VIII 78 (1893–94).
Repair of inside pipe coating. (Discussion.) XXXIV 55 (1920).
Tars, new and old. (S. R. Church.) XXXVI 571 (1922).
See also **PIPE.**

PIPE TESTING.
See **PIPE and WASTE.**

PIPE THAWING AND FROST PROTECTION.
See **ICE.**

PIPE TAPPING.
See **PIPE and PIPE JOINTS.**

PITOMETERS AND PITOT TUBES.
See **MEASUREMENT OF WATER.**

PLUMBING AND PLUMBING EQUIPMENT.
Advantages of modern plumbing over the old-fashioned pump and well. (J. O. Hall.) XV 525 (1900–01).
Cause and effect of range-boiler explosions. (W. A. Bradford.) XXXVII 406 (1923).
Explosion of hot-water boiler, Belmont, Mass. (E. J. Looney.) XXXIV 200 (1920).
Flushometer valves. (Discussion.) XXXVI 467 (1922); XLIII 155 (1929).
Flush valve. (G. M. Fair.) XXXV 137 (1921).
House inspection of fixtures. (Discussion.) VI 34 (1891–92).
Necessity of tanks for supplying water closets and hot-water boilers. (W. R. Billings.) 51 (Trans. 1885).
Plumbers and water-works superintendents. (G. W. Thompson.) XXXV 107 (1921).
Service pipes and plumbing appliances. (D. A. Heffernan.) XXXVII 47 (1923).
Should plumbers be licensed? (Discussion.) I Sept. 26 (1886–87).
Need of uniformity in plumbing regulations. (G. C. Whipple.) XXXV 117 (1921).
Vibration in house services. (Discussion.) XXIV 365 (1910).
Water distribution in connection with plumbing. (D. A. Heffernan.) XXXV 123 (1921).
See also **CORROSION and HYDRAULICS.**

POLLUTION. *See* **QUALITY.**

POOLS. *See* **SWIMMING POOLS.**

POWER, WATER.
Break in hydraulic turbine, Clinton, Mass. (W. E. Foss.) XXXIII 143 (1919).
Power capacity of a stream without storage. (W. G. Raymond.) XXII 184 (1908).
Water power at Holyoke. (A. F. Sickman.) XVIII 337 (1904).
See also **DAMAGES, HYDROLOGY and LAWS.**

PRECIPITATION. *See* **HYDROLOGY.**

PRESSURE.
See **DISTRIBUTION, FIRES and HYDRAULICS.**

PRESSURE GAGES. *See* **GAGES.**

PRESSURE REGULATORS. *See* **GATES.**

PRIVATE FIRE SUPPLIES. *See* **FIRES.**

PRIVATE WATER WORKS.
See **MANAGEMENT and VALUATION.**

PROTECTION, FIRE. *See* **FIRES.**

PROTECTION, FROST. *See* **ICE.**

PROTECTION OF WATER SUPPLY.
See **HEALTH, QUALITY and LAWS.**

PUBLIC HEALTH. *See* **HEALTH.**

PUMPING AND PUMPING STATIONS—GENERAL.
Booster pump for a gravity water supply. (G. F. Merrill.) XXXVII 190 (1923).
Direct pumping method, Taunton, Mass. (G. F. Chace.) VI 67 (1891–92); (G. A. King.) XIX 21 (1905).
Economy in the use of coal. (I. N. Hollis.) XVII 32 (1903).
Engine foundation, Lynn, Mass. (J. C. Haskell.) V 163 (1890–91).
Engines for small water works. (H. A. Symonds.) XXXIII 153 (1919).
Fuel:
Bog fuel. (Edward Atkinson.) XVII 180 (1903); XVIII 414 (1904).
Colorific value. (G. H. Barrus.) X 48 (1895–96); (H. J. Williams.) XIX 90 (1905).
Situation in New England. (I. N. Hollis.) XXXII 217 (1918); (C. T. Main.) XXXII 231 (1918).
Handling air in a tube-well pumping plant. (D. N. Tower.) XII 189 (1897–98).
Pumping engines. (A. J. L. Loretz.) XI 227 (1896–97).
Pumping equipment for station economy. (F. A. Mazzur.) XXXVII 242 (1923).
Pumping equipment, Manchester, N. H. (J. H. Mendell.) XXXII 169 (1918).
Pumping-station design and operation. (R. J. Newsom.) XXXV 46 (1921).
Pumps for small water works. (C. W. Fulton.) XXXIV 1 (1920).
Purchase of coal on an efficiency basis. (A. O. Doane.) XXIV 277 (1910).
Safe ratio of pumping capacity to maximum consumption. (W. B. Sherman.) III 90 (1888–89). (Discussion.) III 104 (1888–89).
Saving of water and conservation of coal. (George A. Carpenter.) XXXII 198 (1918).
Slip tests as an aid to efficiency. (H. T. Havill.) XXIX 511 (1915).
Small pumping engines. (Discussion.) XVI 174 (1902).
Steel forgings for pumping engines. (H. F. J. Porter.) XII 120 (1897–98).
Suction booster for centrifugal pumps. (F. S. Broadhurst.) XXXVIII 119 (1924).
See also **DISTRIBUTION, GROUND WATER, SPECIFICATIONS and SUPPLY.**

PUMPING BY ELECTRICITY.
Changes in power for pumping, Newport, R. I. (Harold Watson.) XLIII 410 (1929).
Dangerous reduction of insulation resistance in high-pressure fire-service motors due to moisture. (W. W. Brush.) XXXIII 337 (1919).
Electrical pumping plant. (C. A. Hague.) X 184 (1895–96).
Electric pumping:
Concord, N. H. (P. R. Sanders.) XXXVI 517 (1922).
Montreal Water and Power Co. (F. H. Pitcher.) XVII 349 (1903).
Schenectady, N. Y. (G. S. Hook.) XX 89 (1906).
Waterville, Me. (Kennebec Water District.) (A. L. Shaw.) XXXIX 32 (1925).
Log book for electrically-driven pumping-unit, New Bedford, Mass. (R. C. P. Coggeshall.) XXXII 173 (1918).
McTavish Pumping Station, Montreal, Que. (C. J. Des Baillets.) XLIII 32 (1929).
Reliability features of an electrically-operated pumping station. (R. C. Dennett and G. L. Swan.) XLI 268 (1927).
Woodlawn Pumping Station, Western New York Water Company, Buffalo, N. Y. (H. F. Huy.) XLIII 387 (1929).

PUMPING BY STEAM.
Compound and triple expansion engines for small water-works plants. (J. M. Betton.) XIII 218 (1898–99).
Distribution pumping-stations, Metropolitan Water Works, Boston, Mass. (A. O. Doane.) XLI 183 (1927).
Duties of pumping engines and fuel consumed. (Diagram.) 24 (Trans. 1882).
Economy of pumping engines. (G. H. Barrus.) XIII 163 (1898–99); (F. W. Dean.) XVIII 25 (1904).
High- and low-duty pumping engines. (J. E. Smith.) XIV 163 (1899–1900).
How to obtain the best results in small pumping stations. (H. F. Gibbs.) XVI 167 (1902).
Improvement in pumping engines. (F. F. Forbes.) XIII 157 (1898–99).
Metropolitan Water Works pumping machinery, Boston, Mass. (W. J. Sando.) XV 299 (1900–01).
Pumping engine practice of the Edward P. Allis Co. (I. H. Reynolds.) XIII 172 (1898–99).
Pumping engines. (F. W. Dean.) VIII 85 (1893–94); (E. D. Leavitt.) IX 163 (1894–95).
Pumping-station practice. (F. W. Dean.) XLII 109 (1928).
Pumping stations, Providence, R. I. (J. A. McKenna.) XL 466 (1926).
Pumping without an air chamber. (G. A. Stacy.) XX 379 (1906).
"Snow" pumping engine, Indianapolis, Ind. (W. F. M. Goss.) XIII 49 (1898–99).
Steam boilers. (F. W. Dean.) XXXVI 115 (1922).
Steam pumping engines. (Alfred O. Doane.) XXXII 121 (1918).
Superheated steam in pumping engines. (E. H. Foster.) XIX 76 (1905).
Test of pumping engine, Waltham, Mass. (F. W. Dean and C. T. Main.) XIV 171 (1899–1900).
Test of the "Unaflow" pumping engine. (D. A. DeCrow.) XXXIII 535 (1919); XXXIV 195 (1920).
Thirty-five-year-old steam pump. (F. O. Stevens.) XXXVII 12 (1923).
Trial of 30-m.g.d. pumping engine, Metropolitan Water Works, Boston, Mass. (W. J. Sando.) XV 232 (1900–01).
Waste heat engines. (E. F. Miller.) XVII 44 (1903).
Worthington pumping machinery. (C. C. Worthington.) XIII 229 (1898–99).

PUMPING BY GAS, ETC.
Centrifugal pumps for Diesel-engine drive. (Max Spillmann.) XXXVII 172 (1923).
Compressed air. (J. H. Shedd.) XIX 1, 19 (1905).
Diesel engine and displacement pumps. (R. D. Hall.) XXXVII 159 (1923); (H. M. Chase.) XXXVII 163 (1923).
Diesel engine and its overall economy. (C. B. Jahnke.) XXXIX 105 (1925).

PUMPING BY GAS, ETC.—(*Continued*).
Diesel engine for water-works service. (C. E. Lucke.) XXXVII 145 (1923).
Diesel engine in a modern forge. (J. P. Harbeson, Jr.) XXXIX 138 (1925).
Diesel engine in a pumping plant. (L. C. S. Smith.) XXXIX 135 (1925).
Diesel-engine pumping equipment. (A. D. Couch.) XLIV 458 (1930).
Gas, gasoline and oil engines for pumping machinery. (F. C. Coffin.) XIII 206 (1898–99).
Gas-producer pumping plants, Manchester, Mass. (R. C. Allen.) XXV 1 (1911); XLIII 56 (1929).
High-service motor, Burlington, Vt. (F. H. Parker.) II Sept. 63 (1887–88).
Hydraulic pumping machinery. (J. T. Fanning.) I Sept. 34 (1886–87).
Producer-gas plant, Hingham, Mass. (H. L. Thomas.) XXII 1, 247 (1908).
Pumping without attendance, using automatic oil engines. (S. A. Agnew.) XX 330 (1906).
Steam versus oil. (R. D. Hall.) XXXVII 182 (1923).
Test of lifting water from wells with air. (F. A. W. Davis.) XIII 51 (1898–99).

PUMPING WELLS.
See **GROUND WATER, PUMPING and SUPPLY.**

PURIFICATION OF WATER.
See **TREATMENT.**

QUALITY OF WATER — GENERAL.
Color of water tributary to the Scituate Reservoir, Providence, R. I. (F. O. Clapp.) XL 530 (1926).
Effect of pipes of different metals upon the quality of water supplies. (H. W. Clark.) XLI 31 (1927).
Iodine and water supplies. (H. W. Clark.) XXXIX 204 (1924).
Iodine in the public water supplies of Massachusetts. (H. W. Clark.) XLII 132 (1928).
Odor and color of surface waters. (T. M. Drown.) II March 3 (1887–88).
Purification by freezing. (T. M. Drown.) VIII 46 (1893–94).
Quality of water, Newton, Mass. (E. H. Rogers.) XXXVII 312 (1923).
Quality of waters of the Great Lakes. (R. B. Dole.) XXIII 254 (1909).
Quality of public water supplies of Vermont. (C. P. Moat.) XV 514 (1900–01); XXXVII 291 (1923).
Quality of surface water supplies of Massachusetts. (J. C. Haskell.) XIII 79 (1898–99).
Rating of the qualities of water supplies, Massachusetts. (G. C. Whipple.) XXXVI 40 (1922).
Review of 19th annual report on water examination, London Metropolitan Water Board. (M. C. Whipple.) XL 33 (1926).
Sanitary scoring of water supplies.
(E. S. Chase.) XXXIX 229 (1925); (Committee report.) XL 416 (1926); XLI 316 (1927).
Tastes in the water supply of Marquette, Mich., due to phenol waste. (Paul Hansen.) XXXIX 320 (1925).
Water and life. (L. J. Henderson.) XXVIII 1 (1914).
See also **ANALYSIS, HEALTH and TREATMENT.**

QUALITY OF WATER — AQUATIC GROWTHS.
Algæ growth in reservoirs and ponds. (F. F. Forbes.) IV 196 (1889–90).
Asterionella. (G. C. Whipple and D. D. Jackson.) XIV 1 (1899–1900).
Chara fragilis in a water-supply reservoir. (F. F. Forbes.) X 252 (1895–96).
Chlamydomonas in Spot Pond. (F. S. Hollis and H. N. Parker.) XIV 26 (1899–1900).
Cristatella in storage reservoir, Henderson, N. C. (R. S. Weston.) XIII 20 (1898–99).
Growth of organisms in water pipes. (G. C. Whipple.) XII 1 (1897–98).

QUALITY OF WATER — AQUATIC GROWTHS.—(*Continued*).
Leptomitus in drinking water. (R. C. Sweetser.) XXVII 282 (1913).
Light and the growth of diatoms. (G. C. Whipple.) XI 1 (1896–97).
Odor and taste imparted to water by some algæ and infusoria. (F. F. Forbes.) VI 90 (1891–92).
Odors and tastes, Holyoke, Mass. (J. L. Tighe). XXIII 324 (1909).
Organisms which cause unpleasant odors and tastes in water supplies. (W. T. Sedgwick.) XIV 54 (1899–1900).
Raphidomonas. (G. C. Whipple.) XI 348 (1896–97).
Temperature of surface waters, and growth of microörganisms. (G. C. Whipple.) IX 202 (1894–95).
See also **ANALYSIS and TREATMENT.**

QUALITY OF WATER — EFFECT OF STORAGE.
Color and other phenomena of water from an unstripped reservoir in New England. (C. M. Saville.) XXXIX 145 (1925).
Color reduction in storage reservoirs. (C. M. Saville.) XLIII 416 (1929).
Decolorization by storage in clean-bottomed reservoirs. (K. R. Kennison.) XLIII 60 (1929).
Decolorization of water by storage. (R. H. Stearns.) XXX 20 (1916).
Effect of storage upon the quality of water. (F. P. Stearns.) V 115 (1890–91).
Period of storage and microörganisms in reservoirs. (R. S. Weston.) XXXIX 225 (1925).

QUALITY OF WATER — POLLUTION, PROTECTION AND CONTROL.
Boating and fishing in ponds and reservoirs used as sources of water supply. (X. H. Goodnough.) XXXIV 151 (1920).
Control of waters by state health authorities:
Massachusetts. (H. F. Mills.) I March 6 (1886–87).
New York. (H. D. Pease.) XXIII 90 (1909); (Theodore Horton.) XXXIII 545 (1919); (C. A. Holmquist.) XLI 261 (1927).
Dangers to the sanitary quality of public water supplies. (E. S. Chase.) XXXVII 16 (1923).
Enforcement with other beverages. (J. F. Jackson.) XLIII 402 (1929).
Eternal vigilance, the price of good water. (G. F. Chace.) IX 147 (1894–95).
How to secure pure water from a surface water supply. (J. C. Haskell.) XI 137 (1896–97).
Pollution of streams affecting industrial uses. (J. F. Jackson.) XXXVI 14 (1922).
Pollution of streams by manufactural wastes and methods of prevention. (H. W. Clark.) XV 500 (1900–01).
Protection of New York's water supply from pollution during construction work. (A. J. Provost, Jr.) XXV 301 (1911).
Protection of public water supplies from pollution by railroads. (W. T. Sedgwick.) XX 427 (1906).
Protection of surface waters from pollution. (W. T. Sedgwick.) XI 245 (1896–97).
Results of systematic examination of public water supplies. (X. H. Goodnough.) XIV 65 (1899–1900).
Sanitary condition, water supply of Burlington, Vt. (W. T. Sedgwick.) X 167 (1895–96).
Sanitary inspection, Metropolitan Water Works, Boston, Mass. (W. W. Locke.) XV 483 (1900–01).
Sanitary protection of public water supplies. (Allen Hazen.) XXXV 297 (1921).
Stream pollution in Connecticut. (J. F. Jackson.) XXXI 627 (1917).
Surface water for drinking purposes. (W. T. Sedgwick.) V 33 (1890–91).
Watching the weather in safeguarding public water supplies. (A. E. Gorman.) XLIII 377 (1929).
Water-supply sanitation in New Hampshire. (C. D. Howard.) XXXI 237 (1917); (C. L. Pool.) XXXVIII 122 (1924).

QUALITY OF WATER — POLLUTION, PROTECTION AND CONTROL.—(*Continued*).
Water-supply sanitation in the nineteenth century. (W. T. Sedgwick.) xv 315 (1900–01).
Water-supply sanitation in the nineteenth century and in the twentieth. (W. T. Sedgwick.) xxx 183 (1916).
See also **MANAGEMENT, LAWS, HEALTH, TREATMENT and WATERSHEDS.**

QUICKSAND. *See* **EXCAVATION.**

RAINFALL. *See* **HYDROLOGY.**

RATES AND ASSESSMENTS.
Assessment and collection of water rates. (F. H. Crandall.) xiv 133 (1896–1900).
Assessments for main pipe extensions. (Committee report.) xxxiv 353 (1920).
Charge for hydrant service. (Discussion.) i Sept. 29 (1886–87); xvii 62 (1903).
Charges for private fire protection. (Discussion.) xv 406 (1900–01); xxviii 60, 140 (1914); (Committee report.) xxxiv 217 (1920); (H. A. Burnham.) xxxviii 111 (1924).
Charges to customers for service connections. (Discussion.) ii Sept. 19 (1887–88).
Charge to customers for water wasted by a broken service pipe. (Discussion.) xxv 131 (1911).
Collecting meter rates. (G. F. Chace.) iv 44 (1889–90); xiv 230 (1899–1900).
Collecting water rates. (J. H. Hathaway.) ii Sept. 68 (1887–88).
Collections of water rates and amounts uncollectible in 48 towns. xxviii 106 (1914).
Determining charges for public use of large streams. (F. H. Crandall.) xi 344 (1896–97).
Expediency of raising water rates to offset increased costs. (J. J. Moore.) xxxii 248 (1918).
Financing main pipe extensions by assessment. (C. M. Saville.) xxxix 185 (1925); xl 22 (1926).
Fire protection, by whom and how it should be paid. (Joel Foster.) xii 270 (1897–98).
Fire protection for factories: how its value shall be determined and who shall pay for it. (J. H. Purdy.) xviii 193 (1904).
Inequalities in water rates. (H. G. Holden.) iv 213 (1889–90).
Meeting water-main costs by assessments for benefits. (M. N. Baker.) xxxiii 186 (1919).
Meter rates. (Discussion.) 41 (Trans. 1883); xviii 222 (1904); xix 43 (1905); (Committee report.) xix 115, 322, 360 (1905); xx 237 (1906); (W. H. Richards.) xxii 289 (1908).
Meter rates and loss of water. (Committee report.) xxviii 90, 199 (1914); xxx 361, 453 (1916).
Meter rates preferable to fixture rates. (F. C. Coffin.) xviii 55 (1904).
Municipal water and sewerage costs in Maryland. (Abel Wolman.) xli 439 (1927).
Municipal water-supply revenue not an equitable means of reducing tax assessments. (J. L. Tighe.) xviii 352 (1904).
Pipe extension charges. (N. S. Hill, Jr.) xxxv 91 (1921).
Proper basis for the establishment of water rates. (Committee report.) vi 39 (1891–92).
Rate of income for domestic service by different classes of residential property. (F. C. Jordan.) xxiv 592 (1910).
Rate revision in municipal works. (Bertram Brewer.) xxxii 1 (1918).
Rates for water supply. (B. M. Wagner.) xxix 1 (1915).
Revenue from fire services and unused domestic services. (Discussion.) xliii 152 (1929).
Uniform classification of water rates. (Committee report.) ii Sept. 32 (1887).
Water rates. (J. C. Chase.) xvii 174 (1903).
Water rates. (Discussion.) xxxvii 196 (1923).
See also **CONSUMPTION, MANAGEMENT and VALUATION.**

RECORDING GAGES. *See* **GAGES.**

RECORDS. *See* **ACCOUNTING.**

RED WATER. *See* **CORROSION.**

REFORESTATION. *See* **WATERSHEDS.**

REGULATIONS.
See **LAWS, MANAGEMENT and VALUATION.**

REGULATION OF PUBLIC UTILITIES.
See **VALUATION.**

REGULATORS. *See* **GATES.**

RELIEF VALVES. *See* **GATES.**

REPORTS. *See* **ACCOUNTING.**

RESERVOIRS — GENERAL.
Construction of reservoir embankments. (L. A. Taylor.) viii 130 (1893–94).
State control of the design and construction of reservoirs, Connecticut. (C. E. Chandler.) xxvi 173 (1912).
See also **DAMS, QUALITY and TREATMENT.**

RESERVOIRS — COMPENSATING.
See **DAMAGES.**

RESERVOIRS — DISTRIBUTING.
Basin and well covering, Waltham, Mass. (F. P. Johnson.) viii 120 (1893–94).
Bursting of the earthenwork reservoir on Munjoy Hill, Portland, Me. (J. R. Freeman.) viii 148 (1893–94).
Cleaning the distributing reservoir, New Bedford, Mass. (R. C. P. Coggeshall.) iv 210 (1889–90).
Cobb's Hill Reservoir, Rochester, N. Y. (J. F. Skinner.) xxiv 498 (1910).
Covered reservoirs. (C. H. Swan.) iii 45 (1888–89).
Covered reservoirs and their design. (F. C. Coffin.) xiv 252 (1899–1900).
Covered reservoirs, their construction and making them watertight. (F. L. Fuller.) xxiii 204 (1909).
Covered reservoirs:
Albany, Ga. (J. C. Chase.) viii 155 (1893–94).
Brookline, Mass. (F. F. Forbes.) viii 113 (1893–94).
Franklin, N. H. (F. L. Fuller.) v 160 (1890–91).
Waltham, Mass. (Bertram Brewer.) xxi 325 (1907).
Covering Natick, Mass., reservoir with a concrete roof. (F. L. Fuller.) xvii 383 (1903).
Covering service reservoirs in which filtered or ground waters are stored. (G. C. Bunker and A. G. Nolte.) xxxvii 261 (1923).
Distributing reservoir, Worcester, Mass. (W. E. Hassam.) xii 153 (1897–98).
Economy of circular reinforced concrete reservoir construction. (Alexander Potter.) xxvi 138 (1912).
High-service reservoir, Manchester, N. H. (C. K. Walker.) x 66 (1895–96).
Relining Payson Park Reservoir, Cambridge, Mass. (L. M. Hastings.) xlii 45 (1928).
Repairs to lining of small reservoir, Powder Horn Hill, Chelsea, Mass. (C. M. Saville.) xix 66 (1905).
Ten-million-gallon Reservoir, Dayton, O. (L. Metcalf and W. T. Barnes.) xxxiii 219 (1919).
Waterproofing the concrete lining of reservoirs. (W. C. Hawley.) xviii 176 (1904).

RESERVOIRS — IMPOUNDING.
Ashland Basin No. 4 and the mixing and handling of concrete, Boston, Mass. (W. F. Learned.) ii Dec. 3 (1887–88).
Clearing and grubbing Scituate Reservoir, Providence, R. I. (W. A. Reid.) xl 499 (1926).
Cochituate Reservoir opened, October, 1848, Boston, Mass. 208 (Trans. 1885).
Construction of Fells Reservoir, Metropolitan Water Works, Boston, Mass. (J. L. Howard). xv 20 (1900–01).

RESERVOIRS — IMPOUNDING.— (*Continued*).
Construction of storage reservoir, New London, Conn. (W. H. Richards.) XVIII 67 (1904).
Flood water channel of the Altoona reservoirs. (C. W. Knight.) XIV 151 (1899–1900).
Grubbing Kensico Reservoir, New York, N. Y. (G. A. Winsor.) XXIX 554 (1915).
Haskell's Brook Reservoir and Dam, Gloucester, Mass. (H. W. Spooner.) XIX 27 (1905).
Kensico Reservoir, New York, N. Y. (W. F. Smith.) XXIX 486 (1915).
Reservoir and dam No. 3, Woonsocket, R. I. (B. I. Cook.) XII 20 (1897–98).
Storage facilities, Pawtucket Water Works. (F. C. Williams.) XLIII 113 (1929).
Worcester's reservoirs. (G. W. Batchelder.) XXXVII 392 (1923).
See also **DAMS.**

REVENUE. *See* **MANAGEMENT and RATES.**

RIGHTS. *See* **LAWS.**

RIVER CROSSINGS. *See* **PIPE.**

RUN-OFF. *See* **HYDROLOGY.**

SAFETY VALVES. *See* **GATES.**

SALT WATER SUPPLIES. *See* **FIRES.**

SAND FILTERS. *See* **TREATMENT.**

SANITATION. *See* **HEALTH and QUALITY.**

SECONDARY SUPPLIES.
See **DISTRIBUTION, FIRES and SUPPLY.**

SEDIMENTATION. *See* **TREATMENT.**

SERVICE PIPES AND EQUIPMENT.
See **PIPE.**

SEWAGE AND WASTE DISPOSAL.
Copper sulphate treatment of sewage. (G. A. Johnson.) XIX 506 (1905).
Explosion of the Saratoga septic tank. (W. P. Mason.) XXI 23, 181 (1907).
Purification of sewage by bacterial methods. (L. P. Kinnicutt.) XV 119 (1900–01).
See also **QUALITY and TREATMENT.**

SINKING FUNDS. *See* **ACCOUNTING.**

SIPHONS. *See* **PIPE.**

SNOWFALL. *See* **HYDROLOGY.**

SOFTENING. *See* **TREATMENT.**

SOIL CORROSION. *See* **CORROSION**

SOURCES OF SUPPLY.
See **GROUND WATER, SUPPLY and WATERSHEDS.**

SPECIFICATIONS AND STANDARDS.
Adoption by foundries of standard specifications. (Discussion.) XX 346 (1906).
Cast-iron pipe specifications. (W. R. Conard.) XXI 54, 367 (1907).
Contract and specifications for furnishing cast-iron water pipes and special castings, New Bedford, Mass. XVIII 264 (1904).
Specifications for cleaning water mains, Hartford, Conn. (C. M. Saville.) XXVII 489 (1913).
Specifications for fire hydrants and valves. (Discussion.) XLIII 157 (1929).
Specifications for pumping engines, St. Louis, Mo. (F. W. Dean.) XI 172 (1896–97).
Standard flanges for water pipes. (F. C. Coffin.) VI 48 (1891–92).
Standard hose couplings. (F. M. Griswold.) XXXIV 63 (1920).
Standard specifications. (Committee report.) XLIII 354 (1929); XLIV 568 (1930).
Standard specifications for cast-iron pipe and other castings. (Committee report.) XVI 92, 330 (1902); XVII 84 (1903); XXVI 170 (1912); XXVIII 92, 348 (1914); XXXII 70, 184 (1918);

SPECIFICATIONS AND STANDARDS.— (*Continued*).
XXXIV 230 (1920); XXXVII 108 (1923); XL 96 (1926); XLI 313 (1927); XLIII 345, 351 (1929).
Standard specifications for fire hydrants. (Committee report.) XXIV 205, 224 (1910); XXV 137 (1911); XXVI 76 (1912); XXVII 154 (1913); XXVIII 89, 184, 194 (1914); XXXIII 99 (1919).
Standard specifications for water meters. (R. J. Thomas.) XXX 430 (1916); (Committee report.) XXXV 187, 394 (1921); XXXVII 201 (1923).
Standard specifications for water works. (E. H. Gowing.) VI 168 (1891–92).
Standardization of manhole frames and covers. (Committee report.) XLI 315 (1927); XLIII 350 (1929).
Standardization of pipe flanges and fittings. (Committee report.) XLII 315 (1928); XLIII 347 (1929).
Standardization of threads for fire-hose couplings and fittings. (F. M. Griswold.) XXXV 43 (1921); (J. H. Howland.) XXXVII 73 (1924).
Standardizing meter dials. (Committee report.) XL 172 (1926).
Uniformity in the direction of opening hydrants and gate valves and of size and shape of hydrant and gate nuts. (Committee report.) XX 348 (1906); XXV 141 (1911); XXVI 74 (1912).
Uniformity of threads for hydrant connections. (Committee report.) XIX 385 (1905).
Wrought-iron pipe and wrought-steel pipe and tubing. (Committee report.) XLIII 353 (1929).

SPILLWAYS.
See **RESERVOIRS (IMPOUNDING).**

SPRINKLERS, AUTOMATIC. *See* **FIRES.**

STANDPIPES AND TANKS.
Cleaning and painting standpipes. (C. W. Sherman.) XXXV 51 (1921).
Concrete standpipes. (Discussion.) XXIX 184 (1915).
Fall of water tower, Fairhaven, Mass. (R. C. P. Coggeshall.) XV 522 (1900–01).
Forbes Hill steel standpipe, Quincy, Mass., with masonry tower. (C. M. Saville.) XVI 177 (1902).
Grouting or cushioning standpipe bases. (Charles W. Sherman.) XXX 131 (1916).
High- and low-service steel standpipe, Atlantic Highlands, N. J. (C. P. Bassett.) VII 215 (1892–93).
Painting standpipes. (Discussion.) XXVI 387 (1912); (Committee report.) XLIV 553 (1930).
Painting standpipe, Middleboro, Mass. (J. E. Beals.) III 157 (1888–89).
Protecting iron and steel standpipes from corrosion. (C. W. Sherman.) XXXIII 272 (1919).
Reducing pressure on a gravity system by use of intermediate standpipe. (E. H. Gowing.) XVII 139 (1903).
Reinforced concrete standpipes:
Attleborough, Mass. (G. H. Snell and F. A. Barbour.) XX 302 (1906).
Hull, Mass. (L. T. Doten.) XIX 33 (1905).
Middleborough, Mass. (G. A. Sampson.) XXX 251 (1916).
Westerly, R. I. (Thomas McKenzie.) XXIX 169 (1915).
Repairs to standpipe, Attleborough, Mass. (H. F. Conant.) XXIX 179 (1915).
Repairs to standpipe, Bath, Me. (C. E. Carter and W. F. Abbott.) XXXV 318 (1921).
Standpipe design and construction, Gloversville, N. Y. (F. A. Marston.) XXXVI 288 (1922).
Standpipes. (B. I. Cook.) XIV 124 (1899–1900).
Standpipes and their design. (F. C. Coffin.) VII 202 (1892–93).
Standpipe, Wilmington, N. C. (J. C. Chase.) VIII 68 (1893–94).
Steel tank and tower, East Providence, R. I. (F. M. Bowman.) XIX 55 (1905).
Two-million-gallon elevated tank, Charleston, S. C. (J. E. Gibson.) XLI 277 (1927).
Waterproofing concrete standpipe, Waltham, Mass. (G. C. Brehm.) XXXVIII 297 (1924).
Water tank, Fall River, Mass. (Patrick Kieran.) II Sept. 26 (1887–88).
See also **DISTRIBUTION and SUPPLY.**

STATISTICS OF WATER WORKS.

Public water supplies:
Connecticut. (W. J. Scott and F. O. A. Almquist.) XLIII 298 (1929).
Maine. (E. W. Campbell.) XLI 99 (1927).
Massachusetts. (A. D. Weston.) XXXVIII 144 (1924).
Rhode Island. (S. De M. Gage.) XL 117 (1926).
Statistics of water purification plants. (Committee report.) XXVIII 220 (1914); XXIX 232 (1915); XXXIV 69 (1920).
Uniform statistics. (Committee report.) XVI 51, 263 (1902).
Water-supply statistics. 223 (Trans. 1885); Boston, Mass. 221 (Trans. 1885); Newton, Mass. 224 (Trans. 1885).
Water-works statistics. (Compiled by the N.E. W.W.A.)

1886.	I	June 29 (1886–87).
	II	March 35 (1887–88).
1887.	II	June 29 (1887–88).
1888–92.	VII	225 (1892–93).
1893.	IX	127 (1894–95).
1894.	X	131 (1895–96).
1895–96.	XII	273 (1897–98).
1896.	XII	282 (1897–98).
1897–99.	XV	65 (1900–01).
1900.	XV	367 (1901).
1901.	XVI	223 (1902).
1902.	XVII	295 (1903).
1903.	XVIII	277 (1904).
1904.	XIX	241 (1905).
1906.	XXI	191 (1907).
1909.	XXIV	419 (1910).

See also **CONSUMPTION.**

STATISTICS, VITAL. *See* **HEALTH.**

STEEL PIPE. *See* **PIPE.**

STERILIZATION.
See **TREATMENT (DISINFECTION).**

STORAGE.
See **HYDROLOGY, QUALITY and RESERVOIRS.**

STORAGE COMPENSATION. *See* **DAMAGES.**

SUBMARINE PIPE. *See* **PIPE.**

SUPPLY — GENERAL.

Conservation of water resources. (M. O. Leighton.) XXII 381 (1908).
Design of small water-works systems. (W. S. Johnson.) XXVIII 144 (1914).
Double municipal supplies. (W. T. Sedgwick and H. P. Letton.) XXV 440 (1911).
Experiences in Hartford, Conn. (C. M. Saville.) XXX 195 (1916).
Experiences in the arid Southwest. (S. M. Allis.) XII 261 (1897–98).
Relation of great ponds to water supplies. (J. F. Jackson.) III 203 (1888–89).
Secondary water supplies, their dangers and value. (Discussion.) XXIV 377 (1910).
Selection of sources of water supply. (F. P. Stearns.) VI 102 (1891–92).
Survey of water-works activities in 1910. (G. A. King.) XXV 161 (1911).
Water supply and its development for small cities in the West. (Wynkoop Kiersted.) V 83 (1890–91).
Water supply in the semi-arid regions of the United States. (Clarence Goldsmith.) XXVI 144 (1912).

See also **GROUND WATER, MANAGEMENT, QUALITY, STATISTICS and TREATMENT.**

SUPPLY — NEW ENGLAND.

Additional supply from Roaring Brook, Pittsfield, Mass. (H. A. Miller.) XXVII 337 (1913).
Additions to New England water-works plants. (Allen Hazen.) XXXVII 233 (1923).
Description of water supplies:
Bridgeport Hydraulic Co. (S. P. Senior.) XXXV 309 (1921).

SUPPLY — NEW ENGLAND.—(*Continued*).

Brockton, Mass. (C. R. Felton.) XX 385 (1906).
Burlington, Vt. (F. H. Crandall.) X 150 (1895–96).
Cambridge, Mass. (L. M. Hastings.) XI 121 (1896–97).
Cohasset, Mass. (D. N. Tower.) XXIX 160 (1915).
East Providence, R. I. (A. C. Dickerman.) XLIII 239 (1929).
Fairhaven, Mass. (J. K. Nye.) VIII 175 (1893–94).
Fall River, Mass. (H. K. Barrows.) XXXVI 549 (1922).
Franklin, N. H. (F. L. Fuller.) VII 82 (1892–93).
Greenfield, Mass. (G. F. Merrill.) XXIX 150 (1915).
Gloucester, Mass. (J. W. Moran.) XXV 381 (1911).
Hartford, Conn. (W. E. Johnson.) XXXI 575 (1917).
Holyoke, Mass. (A. M. French.) XVIII 396 (1904); (P. C. Lucey.) XXXIV 323 (1920).
Lawrence, Mass. (H. W. Rogers.) I Dec. 6 (1886–87).
Lowell, Mass. (R. J. Thomas.) XXVII 1 (1913).
Lynn, Mass. (J. C. Haskell.) X 55 (1895–96).
Madison, Ancon and Emden, Me. (L. L. Wadsworth.) XXXI 207 (1917).
Marlborough, Mass. (G. A. Stacy.) XVI 139 (1902).
Nashua, N. H. (H. G. Holden.) XVI 249 (1902).
New Bedford, Mass. (S. H. Taylor.) XXXVI 370 (1922).
Newport, N. H. (L. A. Taylor.) XII 145 (1897–98).
Peabody, Mass. (F. A. Barbour.) XXI 348 (1907).
Portland, Me. (D. E. Moulton.) XXXI 199 (1917); (J. W. Graham.) XLIII 364 (1929).
Portsmouth, N. H. (J. O. Ayres.) XIII 67 (1898–99).
Provincetown, Mass. (L. E. Hawes.) XI 285 (1896–97).
Salem and Beverly, Mass. (F. F. Longley.) XXX 35 (1916).
Springfield, Mass. (E. E. Lochridge.) XXI 279 (1907).
Waltham, Mass. (G. E. Winslow.) VIII 118 (1893–94).
Ware, Mass. (F. L. Fuller.) II Sept. 49 (1887–88).
Webster, Mass. (F. L. Fuller.) IX 240 (1894–95).
Emergency supply, 1911 and sources of supply, Worcester, Mass. (F. C. Kimball.) XXVI 113 (1912).
Emergency water supply, Leominster, Mass. (W. G. Classon and C. W. Sherman.) XXXIX 450 (1924).
Engineering on additional water supply, Hartford, Conn. (H. W. Horne.) XXXI 588 (1917).
Further water supply of New Bedford, Mass. (Edmund Wood.) XI 202 (1896–97).
Improvement of the water supply, Keene, N. H. (G. A. Sampson and R. S. Weston.) XL 1 (1926).
Improvements to the water supply of the city of Fall River, Mass. (H. K. Barrows.) XXX 46 (1916).
Lawrence, Mass., water supply investigations and construction. (M. Knowles, M. Mansfield, and P. Nugent.) XXXIX 345 (1925).
Making an established water-works system modern and efficient, Lynn, Mass. (R. J. Newsom.) XXXIV 139 (1920).
Massachusetts water report. (Allen Hazen.) XL 44 (1926).
Metropolitan water-supply investigating commission. (Report.) XL 61 (1926).
Metropolitan water supply of Massachusetts. (A. F. Noyes.) X 117 (1895–96).
New water supply, Providence, R. I. (F. F. Winsor.) XXXVI 323 (1922).
New water-works system of the Greenwich Water Company, Conn. (Dana M. Wood.) XLII 378 (1928).

SUPPLY — NEW ENGLAND.—(*Continued*).
Organization of the Portland, Me., Water District. (D. E. Moulton.) XLIII 359 (1929).
Proposed auxiliary water supply, Brockton, Mass. (R. S. Weston.) XXX 324 (1916).
Proposed extension, Metropolitan Water District, Boston, Mass. (X. H. Goodnough.) XXXVI 189 (1922).
Public ownership at Bridgewater, Mass., and improvements. (F. A. Barbour.) XLI 1 (1927).
Water supply of Southeastern Massachusetts. (X. H. Goodnough.) XXXVI 527 (1922).
Watuppa Ponds for Fall River, Mass. (T. M. Stetson.) I June 3 (1886–87).

SUPPLY — UNITED STATES OUTSIDE OF NEW ENGLAND.
Catskill supply, New York, N. Y.:
Esopus and Rondout. (Rudolph Hering.) XVIII 360 (1904).
Status of development. (J. W. Smith.) XXIX 481 (1915).
Schoharie development. (J. W. Smith.) XXXIII 257 (1919).
Visit to. (Desmond FitzGerald.) XXXII 393 (1917).
Description of supplies:
Brooklyn, N. Y. (W. F. Laasc.) XXIX 546 (1915).
Buffalo, N. Y. (L. H. Knapp.) XIV 206 (1899–1900).
East Jersey Water Co. (Clemens Herschel.) VIII 18 (1893–94).
Newton, N. J. (L. L. Tribus.) XXIII 145 (1909).
New York, N. Y. (W. W. Brush.) XXIII 371 (1909).
Philadelphia, Pa. (J. C. Trautwine, Jr.) XXII 419 (1908).
Pottsville, Pa. (N. J. Beisel.) XXXIX 47 (1925).
Poughkeepsie, N. Y. (J. C. Otis.) XXIII 283 (1909).
Richmond, Va. (C. E. Bolling.) IV 39 (1889–90).
Rochester, N. Y. (E. A. Fisher, B. C. Little and F. T. Elwood.) XXIV 473, 485, 492 (1910).
Syracuse, N. Y. (M. B. Palmer.) XXXVIII 226 (1924).
Tampa, Fla. (N. S. Hill, Jr.) XL 128 (1926).
Troy, N. Y. (E. L. Grimes.) XXII 164 (1908).
Establishment of Metropolitan District, Baltimore County, Md. (V. B. Siems.) XXXVIII 250 (1924).
Increase of available water supply, with no capital investment, Utica, N. Y. (F. E. Beck.) XXXVIII 232 (1924).
Mississippi River as a source of water supply. (E. G. Smith.) XIX 215 (1905).
New York, N. Y., water-supply report of 1883. (J. M. Betton.) XVIII 254 (1904).
Sources of supply, conduits and reservoirs, Rochester, N. Y. (J. F. Skinner.) XXXVIII 219 (1924).
Wanaque water-works project. (Arthur H. Pratt.) XLIV 386 (1930).
Water supplies of the New York Metropolitan District with special reference to their purification. (G. C. Whipple.) XIX 451 (1905).

SUPPLY — FOREIGN.
Description of water supplies:
Camaguey, Cuba. (H. A. Young.) XXIII 264 (1909).
Caracas, Venezuela. (Thorndike Saville.) XLII 303 (1928).
Geneva, Switzerland. (A. Bétant and G. C. Whipple.) XXXV 19, 22 (1921).
Glasgow, Scotland. (J. M. Gale.) XIV 240 (1899–1900).
Montreal, Canada. (George Janin.) XVII 272, 378 (1903).
Quebec, Canada. (J. A. Tremblay.) XXXIX 208 (1925).
European water supplies. (Allen Hazen.) IX 109 (1894–95).
Water in Holland, 1887. (A. W. Locke.) V 45 (1890–91).

SUPPLY — FOREIGN. — (*Continued*).
Water in Japan. (W. S. Chaplin.) I Dec. 20 (1886–87); (Allen Hazen.) XLIV 451 (1930).
Water supply at Panama. (C. E. Davis.) XX 252 (1906); (H. K. Higgins.) XXV 454 (1911); (E. W. Clarke.) XXVI 1 (1912).
Water-works practice abroad. (C. W. Sherman.) XL 297 (1926).

SUPPLY — MILITARY.
Military and emergency water supplies. (G. C. Danforth.) XLI 129 (1927).
Twenty-sixth Engineers — Water Supply Regiment — A. E. F. XXXIII 569 (1919).
Water supplies for the American Expeditionary Forces. (F. F. Longley.) XXXIII 465 (1919).
Water supply, Camp Devens. (Frank Barbour.) XXXII 145, 299 (1918).

SWAMP DRAINAGE. *See* **WATERSHEDS.**

SWIMMING POOLS.
Swimming-pool management. (W. P. Mason.) XXXIII 458 (1919).

TANKS. *See* **STANDPIPES.**

TAPPING PIPES. *See* **PIPE JOINTS.**

TASTES AND ODORS.
See **QUALITY and TREATMENT.**

THAWING. *See* **ICE.**

THEFT OF WATER.
See **ACCOUNTING and MANAGEMENT.**

THICKNESS OF PIPE.
See **PIPE and SPECIFICATIONS.**

TOWERS. *See* **STANDPIPES.**

TRADE WASTES. *See* **SEWAGE.**

TREATMENT AND TREATMENT PLANTS — GENERAL.
Developments in water purification. (W. Donaldson.) XLII 372 (1928).
Difficulties in water purification. (G. T. Swarts.) XXV 191 (1911).
Electrical purification of water. (T. M. Drown.) VIII 183 (1893–94).
Man's imitation of nature in purification of water. (G. T. Swarts.) XIII 1 (1898–99).
Purification of salt water, Gloucester, Mass. (R. S. Weston.) XXV 386 (1911).
Small purification plants: plea for more efficient operation. (H. P. Letton.) XXVII 532 (1913).
Unusual methods of water purification. (M. E. Flentje.) XLIII 38 (1929).
See also **STATISTICS and SUPPLY.**

TREATMENT — AËRATION AND DECARBONATION.
Aëration of natural waters. (T. M. Drown.) VII 96 (1892–93).
Aëration of water. (C. B. Brush.) II Sept. 71 (1887–88).
Aëration of water supplies by natural canals and low dams. (S. E. Babcock.) III 35 (1888–89).
Aëration in water purification. (Malcolm Pirnie.) XLIII 395 (1929).
Decarbonation of public water supplies. (G. C. Whipple.) XXVII 193, 445 (1913).

TREATMENT — COAGULATION AND SEDIMENTATION.
Application of coagulant intermittently, Springfield, Mass. (E. E. Lochridge.) XXXI 48 (1917).
Clarification of Catskill water by coagulation and sedimentation. (W. W. Brush.) XLII 65 (1928).

TREATMENT — COAGULATION AND SEDIMENTATION.—(*Continued*).

Hydrogen-ion concentration in water purification. (H. P. Eddy.) XXXV 385 (1921).
Mechanically-cleaned sedimentation basins for water works. (E. B. Besselievre.) XLI 52 (1927).
Removal of color from water. (Discussion.) XVI 156 (1902); (H. W. Clark.) XVII 1 (1903).

TREATMENT — CONTROL AND REMOVAL OF AQUATIC GROWTHS, TASTES AND ODORS.

Application of copper sulphate to Hartford Reservoir and effects upon length of filter runs. (J. E. Garratt.) XXXVI 522 (1922).
Chlorine studies and taste-producing substances. (N. J. Howard and R. E. Thompson.) XL 276 (1926); XLI 59 (1927).
Control of microscopic organisms. (William Haine.) XXXII 10 (1918).
Control of microscopic organisms with particular reference to New York City. (F. E. Hale.) XLIV 361 (1930).
Copper sulphate as an algicide. (G. T. Moore.) XIX 474 (1905); (D. D. Jackson.) XIX 483, 563 (1905); (X. H. Goodnough.) XIX 525 (1905).
Copper sulphate treatment of Cape Pond, Rockport, Mass. (E. S. Chase.) XXXVIII 48 (1924).
Removal of color, organisms and odor from water. (H. W. Clark.) XVII 1 (1903).
Removal of microscopic organisms from ponds and reservoirs by copper sulphate. (Symposium.) XIX 474 (1905).
Removing organisms from reservoir, Syracuse, N. Y. (W. R. Hill.) XIV 213 (1899–1900).
Removing organisms from water. (F. S. Hollis.) XIV 221 (1899–1900).

TREATMENT — DISINFECTION.

Automatic chlorination, Concord, N. H. (P. R. Sanders.) XLIII 399 (1929).
Chlorination. (R. V. Donnelly.) XLII 79 (1928).
Chlorination of New England water supplies. (W. J. Orchard.) XXXVI 99 (1922).
Chlorine control apparatus for sterilization of water supplies. (G. H. Pratt.) XXXVIII 63 (1924).
Copper sulphate as a disinfectant. (W. P. Mason.) XIX 481 (1905); (D. D. Jackson.) XIX 483, 563 (1905); (J. W. Ellms.) XIX 496 (1905); (H. W. Clark.) XIX 503 (1905).
Disinfection as an adjunct to water purification. (H. W. Clark and S. De M. Gage.) XXIII 302 (1909).
Double municipal supplies, one pure, the other sterilized. (W. T. Sedgwick and H. P. Letton.) XXV 440 (1911).
Making chlorine at the point of consumption. (C. W. Marsh.) XXXVI 1 (1922).
Metallic copper as a disinfectant. (Henry Kraemer.) XIX 487 (1905).
Ozone as a sterilizing agent for water purification. (S. T. Powell.) XXIX 87 (1915).
Ozonization of water. (G. A. Soper.) XV 1 (1900–01).
Sterilization of surface water by chemical methods. (B. Kröhnke.) XIX 551 (1905).
Ultra-violet rays for water purification. (Max von Recklinghausen.) XXIX 202 (1915).
Water disinfection in Maryland. (R. B. Morse and H. R. Hall.) XXX 301 (1916).
Water sterilization, Wakefield, Mass. (E. C. Sherman.) XXX 135 (1916).

TREATMENT — FILTRATION.

Collapse of filter roof, Lawrence, Mass. (S. E. Thompson.) XXII 237 (1908).
Double filtration of water. (H. W. Clark.) XXIV 585 (1910).
Experiments in filtering Allegheny River water, Pittsburgh, Pa. (Morris Knowles.) XV 148 (1900–01).
Fineness modulus for filter sands. (R. G. Tyler.) XXXIX 239 (1925); XL 24 (1926).
Filter design. (J. W. Armstrong.) XXXIX 254 (1925).

TREATMENT—FILTRATION.—(*Continued*).

Filtration of water. (H. W. Rogers.) 54 (Trans. 1884); (C. B. Brush.) II Sept. 71 (1887–88); (Edwin Darling.) III 165 (1888–89); (T. M. Drown.) V 91 (1890–91).
Filtration, Panama. (H. K. Higgins.) XXV 454 (1911).
Purification experiments, Brisbane, Australia. (Hardolph Wasteneys.) XXV 422 (1911).
Loss of head in rapid sand-filters. (R. G. Tyler, W. A. Danielson and Maurice LeBosquet, Jr.) XL 322 (1926).
Mechanical filter bottoms and strainer systems. (R. S. Weston.) XXXI 474 (1917).
Mechanical filtration. (E. B. Weston.) XIV 333 (1899–1900).
Rapid sand-filtration. (George A. Johnson.) XXXI 390 (1917).
Rapid sand-filtration plants.— Description:
Cambridge, Mass. (G. A. Johnson.) XXXVII 339 (1923).
Greenwich Water Co., Conn. (E. S. Chase.) XLII 396 (1928).
Miraflores, C. Z. (G. M. Wells.) XXVIII 238 (1914).
Montreal, Que. (F. E. Field.) XXXIX 213 (1925); (F. E. Field and J. H. Harrington.) XLII 359 (1928).
New Orleans, La. (R. S. Weston.) XVII 27, 157 (1903).
Newport, R. I. (R. E. Milligan.) XXV 60 (1911).
Providence, R. I. (W. W. Kittredge.) XL 522 (1926).
Putnam, Conn. (F. O. Stevens.) XXXVIII 103 (1924).
Rochester and Lake Ontario, Water Co., N. Y. (J. M. Caird.) XXIV 503 (1910).
Wheeling, W. Va. (J. F. Laboon.) XXXIX 291 (1925).
Rapid sand-filtration plants.— Operation:
Cambridge, Mass. (M. C. Whipple and H. C. Chandler.) XLI 218 (1927).
Evanston, Ill. (J. W. Gaitenby.) XXXI 619 (1917).
Providence, R. I. (J. W. Bugbee and E. L. Bean.) XLI 399 (1927).
Toronto, Ont. (N. J. Howard.) XXXIII 504 (1919).
Watertown, N. Y. (F. H. Jennings.) XXXIX 68 (1925).
Relative applicability of sand and mechanical filters. (G. W. Fuller.) XIV 32 (1899–1900).
Sand filtration, with special reference to American needs and European experience. (W. T. Sedgwick.) VII 103 (1892–93).
Selection of filter sand. (Allen Hazen.) VII 165 (1892–93).
Slow sand-filtration plants.— Description:
Albany, N. Y. (Allen Hazen.) XIV 291 (1899–1900).
Ashland, Wis. (William Wheeler.) XI 301 (1896–97).
Gardiner, Me. (Henry Richards.) XXXI 216 (1917).
Lawrence, Mass. (M. F. Collins.) XVII 288 (1903).
Milford, Mass. (F. L. Northrop.) X 262 (1895–96).
Nantucket, Mass. (W. F. Codd.) VIII 171 (1893–94).
Philadelphia, Pa. (J. C. Trautwine, Jr.) XXII 419 (1908).
South Norwalk, Conn. (H. W. Clark.) XXX 86 (1916).
Springfield, Mass. (C. F. Story.) XXIII 229 (1909).
Slow sand-filtration plants.— Operation:
Burlington, Vt. (O. A. Canning.) XXXVII 396 (1923).
Lawrence, Mass. (H. F. Mills.) IX 44 (1894–95); (H. W. Clark.) XIV 82 (1899–1900); (M. Knowles, M. F. Collins and A. D. Marble.) XXII 193 (1908).
Philadelphia, Pa. (Torresdale). (F. D. West and J. S. V. Siddons.) XXVII 358 (1913).
Poughkeepsie, N. Y. (C. E. Fowler.) XII 209 (1897–98).

TREATMENT — FILTRATION.—(*Continued*).
Providence, R. I. (F. L. Cady.) XXXII 21 (1918); (J. W. Bugbee.) XXXVIII 244 (1924); XL 464 (1926).
Uses and abuses of water filtration. (G. H. Pratt.) XXVI 341 (1912).
Water ejector for transporting sand. (Morris Knowles and J. M. Rice.) XXV 83 (1911).
Water purification by filters charged with aluminum or ferric hydroxide. (H. W. Clark.) XXXVI 385 (1922); XXXVIII 84 (1924).

TREATMENT — IRON REMOVAL.
Deferrization and demanganization of water, Cohasset, Middleboro, and Brookline, Mass. (R. S. Weston.) XXVIII 27 (1914).
Iron-removal plants:
Amesbury, Mass. (G. A. Sampson.) XLII 53 (1928).
Reading, Mass. (L. M. Bancroft.) XI 294 (1896–97).
Removal of iron from ground waters by coke filters. (H. W. Clark.) XI 277 (1896–97).

TREATMENT — SOFTENING.
Water-softening plant, Oberlin, O. (W. B. Gerrish.) XIX 422 (1905).

TRENCHING AND TRENCHING MACHINERY. *See* **EXCAVATION and PIPE.**

TUBERCULATION. *See* **CORROSION.**

TUNNELS. *See* **CONDUITS.**

TYPHOID. *See* **HEALTH.**

ULTRA VIOLET RAYS.
See **TREATMENT (DISINFECTION).**

VALUATION AND REGULATION OF PUBLIC UTILITIES.
Comparing economy of structures of different classes. (G. F. Swain.) II March 32 (1887–88).
Control of public utility companies by public-service commissions. (Leonard Metcalf.) XXX 160 (1916).
Court decisions, incident to purchase of Braintree Water Supply Co. (H. A. Symonds.) XXXVI 426 (1922).
East Providence Water Company rate case. (A. C. Dickerman.) XLIII 246 (1929).
Governmental regulation of water powers. (M. O. Leighton.) XXIV 259 (1910).
Maine water districts and appraisals. (H. D. Eaton.) XIX 147 (1905).
Principles of rate-making. (W. M. Wherry.) XL 249 (1926).
Public-service regulation. (W. D. Worthen.) XXXI 163 (1917).
Regulation of private water companies, New York City. (Delos F. Wilcox.) XXXI 550 (1917).
State regulation of public utilities. (Morris Knowles.) XXVI 272 (1912).
See also **MANAGEMENT.**

VALVES. *See* **GATES.**

VENTURI METERS.
See **MEASUREMENT OF WATER.**

VITAL STATISTICS. *See* **HEALTH.**

WASTE, LEAKAGE, PIPE BREAKS AND PIPE TESTING.
Allowable leakage from water mains. (E. G. Bradbury.) XXVIII 315 (1914).
Breaks in cement-lined pipes. (J. C. Haskell.) VII 171 (1892–93).
Breaks in water mains. (S. E. Killam.) XXXI 268 (1917).
Control of water waste by house-to-house inspection. (G. Z. Smith.) XXXV 322 (1921).
Detecting leaks in underground pipes. (D. A. Heffernan.) XXXII 204 (1918).

WASTE, LEAKAGE, PIPE BREAKS AND PIPE TESTING.—(*Continued*).
Detecting water waste. (B. I. Cook.) VII 22 (1892–93).
Detection and prevention of water waste, Marion, O. (E. H. Cowan.) XVIII 185 (1904).
Detection of leakage by Bell waterphone. 73 (Trans. 1884).
Efficacy of inspection to reduce water waste. (Discussion.) 30 (Trans. 1883).
Efficacy of meters in water-waste prevention. (Discussion.) 30 (Trans. 1883).
Experiences with broken pipes. (Committee report.) XXII 368 (1908); XXIII 435 (1909); XXVII 160 (1913).
Leakage detection. (Patrick Gear.) XXVIII 68 (1914).
Leakage from lead joints in cast-iron water-pipe. (A. H. Smith.) XXX 1 (1916).
Leakage from pipe joints. (Frank A. Barbour.) XXX 439 (1916).
Leaks and litigation. (G. H. Finneran.) XLI 201 (1927).
Locating leaks in water mains. (J. Hoxie.) XXVII 307 (1913).
Location of a broken main. (G. A. Stacy.) VII 222 (1892–93).
Location of leak in a submarine pipe line. (E. G. Hooper.) XXIX 536 (1915).
Municipal use and waste of water. (John Venner.) XVII 268 (1903).
Peculiar leak in a main pipe adjacent to a gas pipe. (R. C. P. Coggeshall.) XXI 487 (1907).
Saving of water and conservation of coal. (G. A. Carpenter.) XXXII 198 (1918).
Waste restriction, Boston, Mass. (F. A. McInnes.) XXXV 34 (1921).
Water loss from pipes. (F. H. Crandall.) XII 243 (1897–98).
Water waste. (Committee report.) 27 (Trans. 1883); (Dexter Brackett.) I Dec. 2 (1886–87).
Water waste, Metropolitan Water Works, Boston, Mass. (Dexter Brackett.) XVIII 107 (1904).
Water-waste prevention, New York City. (W. W. Brush.) XXVII 407 (1913).
Water-waste prevention surveys. (Paul Lanham.) XXXIII 287 (1919).
See also **CONSUMPTION and PIPE.**

WASTE DISPOSAL. *See* **SEWAGE.**

WATER — ANALYSIS, CONDUITS, CONSERVATION, CONSUMPTION, DISTRIBUTION, INTAKES, LABORATORIES, LAWS, MEASUREMENT, METERS, PIPE, POWER, QUALITY, RATES, SUPPLY, TREATMENT, WASTE.
See **ANALYSIS, CONDUITS, CONSERVATION, CONSUMPTION, DISTRIBUTION, INTAKES, LABORATORIES, LAWS, MEASUREMENT, METERS, PIPE, POWER, QUALITY, RATES, SUPPLY, TREATMENT, WASTE.**

WATER ASSESSMENTS. *See* **RATES.**

WATER BACTERIOLOGY, BIOLOGY AND CHEMISTRY.
See **ANALYSIS, QUALITY and TREATMENT.**

WATER-BORNE DISEASES. *See* **HEALTH.**

WATER COMPANIES.
See **MANAGEMENT and VALUATION.**

WATER DISTRICTS.
See **MANAGEMENT and SUPPLY.**

WATER DIVERSION.
See **DAMAGES and LAWS.**

WATER FILTRATION. *See* **TREATMENT.**

WATER FLOW. *See* **HYDRAULICS.**

WATER HAMMER. *See* **HYDRAULICS.**

WATERING STATIONS. *See* **FOUNTAINS.**

WATERPROOFING.
See **RESERVOIRS and STANDPIPES.**

WATER PURIFICATION.
See **TREATMENT.**

WATER RAM. *See* **HYDRAULICS.**

WATER RIGHTS. *See* **LAWS.**

WATER TANKS AND TOWERS.
See **STANDPIPES.**

WATERSHEDS.
Care of large watersheds. (F. I. Winslow.) XXXVII 385 (1923).
Can high-value watershed lands be put to profitable use. (Discussion.) XXXVI 279 (1922).
Costs and results obtained in reforestation of Croton Watershed. (T. C. Culyer.) XXX 69 (1916).
Desirability of making watershed areas and sanitary districts coterminous. (R. E. Middleton.) XIII 119 (1898–99).
Forest conservation. (R. S. Kellogg.) XXII 389 (1908).

WATERSHEDS.—*(Continued).*
Forestry and water works. (L. W. Goodrich.) XXIV 345 (1910); (E. S. Bryant.) XXV 243 (1911); (J. W. Toumey.) XXXI 247 (1917).
Forestation of watersheds. (F. M. Rane.) XXV 234 (1911); (S. K. Clapp.) XXX 64 (1916); (P. W. Ayres.) XXXVII 127 (1923).
Protection of catchment areas. (J. F. Skinner.) XLIII 1 (1929).
Sanitary improvement of a large drainage area in the Catskill region. (G. G. Honness.) XXIX 502 (1915).
Swamp-drainage for watershed improvement. (Edward S. Larned.) XVI 38 (1902).
Wire fences and concrete posts, New York water supply. (R. N. Wheeler.) XXX 124 (1916).
See also **HEALTH and QUALITY.**

WATER STERILIZATION.
See **TREATMENT.**

WATER WORKS. *See* **SUPPLY.**

WELDING. *See* **PIPES and PIPE JOINTS.**

WELLS.
See **GROUND WATER and PUMPING.**

WOOD PIPE. *See* **PIPE (WOOD).**

WROUGHT-IRON PIPE.
See **PIPE (STEEL).**

YIELD OF CATCHMENT AREAS.
See **HYDROLOGY.**

AUTHOR INDEX.

ABBOTT, WILLIAM F.
Repairs to standpipe, Bath, Me. (with C. E. Carter). XXXV 318 (1921).

ADAMS, ARTHUR L.
Stave pipe. XIII 247 (1898–99).

AGNEW, SAMUEL A.
Pumping without attendance. XX 330 (1906).

ALLARD, THOMAS T.
Scituate Aqueduct, Providence, R. I. XL 546 (1926).

ALLEN, CHARLES A.
Placing a bridge in position. III 197 (1888–89).

ALLEN, KENNETH
Wood-stave conduit, Atlantic City, N. J. XVIII 374 (1904).

ALLEN, RAYMOND C.
Gas-producer pumping-plants, Manchester, Mass. XXV 1 (1911); XLIII 56 (1929).

ALLIS, SOLON M.
Economy in water-works management. VI 161 (1891–92).
Erosion on the Pacific slope. III 158 (1888–89).
Pipe system, Malden, Mass. V 164 (1890–91).
Water supply in the arid Southwest. XII 261 (1897–98).

ALMQUIST, F. O. A.
Public water supplies, Connecticut. (with W. J. Scott). XLIII 298 (1929).

ANTHONY, CHARLES
Turbidimeter. XVI 256 (1902).

ARMSTRONG, JAMES W.
Filter design. XXXIX 254 (1925).

ARNOLD, H. S.
Monel metal for water-works uses. XXXVI 86 (1922).

ATKINSON, EDWARD
Bog fuel. XVIII 414 (1904).
Fuel. XVII 180 (1903).
Relation of water-works engineers to fire service of factories. XVII 58 (1903).

ATWOOD, THOMAS C.
Destroyer plant, Squantum, Mass. XXXIII 1 (1919).

AYRES, JOHN O.
Water works, Portsmouth, N. H. XIII 67 (1898–99).

AYRES, PHILLIP W.
Reforestation of watersheds. XXXVII 127 (1923).

BABB, CYRUS C.
Legal aspects of water-power development in Maine. XXVI 190 (1912).

BABCOCK, STEPHEN E.
Aeration. III 55 (1888–89).
Safety valves in distribution systems. III 57 (1888–89).

BAILEY, GEORGE I.
Care of hydrants in winter. XIV 116 (1899–1900).
Effect of meters on consumption. XV 351 (1900–01).

BAKER, M. N.
Meeting water-main costs by assessments for benefits. XXXIII 186 (1919).
Uniformity in municipal reports. XV 189 (1900–01).
Water supply and disease, Burlington, Vt. XX 163 (1906).

BALL, PHINEAS
Experience with a sand blast. III 158 (1888–89).
Soils from which water supplies may be drawn. III 29 (1888–89).

BANCROFT, LEWIS M.
Iron-removal plant, Reading, Mass. XI 295 (1896–97).

BARBOUR, FRANK A.
Insurance rates and water service. XXII 322 (1908).
Leakage from pipe joints. XXX 439 (1916).
Little Quittacas intake, New Bedford, Mass. XXXIX 370 (1925).
Public ownership and improvements, Bridgewater, Mass. XLI 1 (1927).
Standpipe, Attleborough, Mass. (with G. H. Snell). XX 310 (1906).
Water supply, Camp Devens, Mass. XXXII 145, 299 (1918).

BARNES, HOWARD T.
Ice formation. XXIV 576 (1910).
Thermit for ice troubles. XL 312 (1926).

BARNES, WILLIAM T.
Arched masonry dam, Las Vegas, N. M. XXVI 356 (1912).
Distribution reservoir, Dayton, O. (with Leonard Metcalf). XXXIII 219 (1919).

BARROWS, HAROLD K.
Estimating stream flow in New England. XIX 437 (1905).
Water supply, Fall River, Mass. XXX 46 (1916); XXXVI 549 (1922).

BARRUS, GEORGE H.
Calorific value of fuel. X 48 (1895–96).
Economy of pumping engines. XIII 163 (1898–99).

BARTRAM, GEORGE C.
Reinforced concrete pipe. XXXIV 312 (1920).

BASSETT, CARROLL P.
Standpipe, Atlantic Highlands, N. J. VII 215 (1892–93).

BATCHELDER, GEORGE W.
Automobile for efficiency. XXVIII 281 (1914).
Reservoirs, Worcester, Mass. XXXVII 392 (1923).
Trenching-machine experiences. XXXI 486 (1917) XXXIV 315 (1920).

BEACH, D. N.
Water in its higher relations. III 133 (1888–89).

BEALS, JOSEPH E.
Painting standpipe, Middleboro, Mass. III 157 (1888–89).
Raising pipes in trench. XX 244 (1906).

BEAN, ELWOOD L.
Operation of filtration plant, Providence, R. I. (with J. W. Bugbee). XLI 399 (1927).

BECK, FREDERIC E.
Increase of available supply, Utica, N. Y. XXXVIII 232 (1924).
Metering fire services. XXXIV 125 (1920).

BEHNEY, C. C.
Meters and other equipment. XXXVIII 294 (1924).

BEISEL, N. J.
Additional water supply, Pottsville Water Co., Pottsville, Pa. XXXIX 47 (1925).

BESSELIEVRE, EDMUND B.
Mechanically-cleaned sedimentation basins. XLI 52 (1927).

BÉTANT, A.
Water supply, Geneva, Switzerland. (with G. C. Whipple). XXXV 22 (1921).

BETTON, JAMES M.
Pumping engines for small plants. XIII 218 (1898–99).
Water-supply report of 1883, New York, N. Y. XVIII 254 (1904).

BILLINGS, WILLIAM R.
Tanks for supplying water closets and hot-water boilers. 51 (Trans. 1885).

BISER, D. BENTON
Design of distribution systems. (with V. B. Siems). XLIII 284 (1929).

BLAKE, EDMUND M.
Pitometer. XX 152 (1906).

BLATT, MAX
Laying water pipes in congested streets, New York, N. Y. XXIX 513 (1915).

BOGGS, R. W.
Oxy-acetylene process in the piping field. XLIII 44 (1929).

BOLLING, CHARLES E.
Water works, Richmond, Va. IV 39 (1889–90).

BOOTH, GEORGE W.
High-pressure fire systems. XXXVI 495 (1922).

BOWERS, GEORGE
Tube wells, Lowell, Mass. IX 67 (1894–95); X 226 (1895–96); XIII 30 (1898–99).
Underground water. XVII 127 (1903).

BOWMAN, F. M.
Water tank and tower, East Providence, R. I. XIX 55 (1905).

BOYCE, W. C.
Tests by tubular wells of available water. III 26 (1888–89).

BRACKETT, DEXTER
Capacity of steam fire-engines, hydrants, and hose, Boston, Mass. IX 151 (1894–95).
Measurement, consumption and waste of water, Metropolitan Water District. XVIII 107 (1904).
Raising or lowering large water pipes. III 198 (1888–89).
Water pipes, Metropolitan Water Works. XIII 325 (1898–99).
Water supply at Boston fire, Nov. 23, 1889. IV 182 (1889–90).
Water waste. I Dec. 11 (1886–87).

BRADBURY, E. G.
Allowable leakage from mains. XXVIII 315 (1914).

BRADBURY, RICHARD R.
Scituate Tunnel, Providence, R. I. XL 535 (1926).

BRADFORD, WILLIAM A.
Range-boiler explosions. XXXVII 406 (1923).

BRAINARD, FRANK
Distribution system, Hartford, Conn. XXXI 581 (1917).

BRANN, WALLACE R.
Siphon operation on main supply line. (with C. W. Sherman). XXXV 36 (1921).

BREHM, GEORGE C.
Waterproofing concrete standpipe, Waltham, Mass. XXXVIII 297 (1924).

BREWER, BERTRAM
Covered reservoir, Waltham, Mass. XXI 325 (1907).
Public control over new streets for water-main extensions. XXXIII 436 (1919).
Rate revision in municipal works. XXXII 1 (1918).

BROADHURST, FRANK S.
Suction booster for centrifugal pumps. XXXVIII 119 (1924).

BROOKS, CHARLES F.
New England rainstorm, Nov. 3–4, 1927. (with J. H. Weber). XLII 91 (1928); XLIV 106 (1930).
Rainfall of New England. XLIV 1 (1930).

BROOKS, FREDERICK
Gallons *vs.* liters and cubic meters. XVII 258 (1903).

BROWN, A. W. F.
Card system of service locations. IX 226 (1894–95).
Meter records for small water works. XXX 427 (1916).

BROWN, J. HENRY
Flushing street mains. 70 (Trans. 1885).

BROWNE, ROBERT L.
Thermit pipe-welding. XLII 21 (1928).

BROWNELL, E. E.
Electrolysis. XIV 363 (1899–1900).

BRUSH, CHARLES B.
Aëration and filtration. II Sept. 71 (1887–88).

BRUSH, WILLIAM W.
Clarification of Catskill supply by coagulation and sedimentation. XLII 65 (1928).
Insulation resistance of high-pressure fire-service motors. XXXIII 337 (1919).
Water supply, New York, N. Y. XXIII 371 (1909).
Water-waste prevention, New York, N. Y. XXVII 407 (1913).

BRYANT, EDWARD S.
Forestry. XXV 243 (1911).

BUGBEE, JULIUS W.
Operation of filtration plant, Providence, R. I. (with E. L. Bean). XLI 399 (1927).
Water treatment methods, Providence, R. I. XXXVIII 244 (1924); XL 464 (1926).

BUNKER, GEORGE C.
Covering service-reservoirs for filtered or ground waters. (with A. G. Nolte). XXXVII 261 (1923).

BURNHAM, H. A.
Charges for private fire-protection. XXXVIII 111 (1924).

BURDICK, CHARLES B.
Infiltration galleries, Des Moines, Ia. XXXVIII 203 (1924).

CADY, FRANK L.
Filtration methods and results, Providence, R. I. XXXII 21 (1918).

CAIRD, JAMES M.
Purification plant, Rochester and Lake Ontario Water Co., Rochester, N. Y. XXIV 503 (1910).

CAIRNS, R. A.
Shepaug Tunnel, Waterbury, Conn. XLIII 258 (1929).

CALDWELL, JOHN S.
Grading fire-defenses of municipalities. XXXV 1 (1921).

CAMPBELL, ELMER W.
Public water supplies of Maine. XLI 99 (1927).

CANNING, O. A.
Filtration, Burlington, Vt. XXXVII 396 (1923).

CAPRON, JOHN D.
Soil-corrosion tests, U. S. Bureau of Standards. XLI 81 (1927).

CARPENTER, GEORGE A.
Saving water and conserving coal. XXXII 198 (1918).

CARTER, CLARENCE E.
Repairs to standpipe, Bath, Me. (with W. F. Abbott). XXXV 318 (1921).

CAVALLIER, C.
Life of cast-iron pipe. XVIII 218 (1904).

CHACE, GEORGE F.
Artesian well experiment, Taunton, Mass. IV 221 (1889–90).
Care of mains. V 131 (1890–91).
Collecting meter rates. IV 44, 230 (1889–90).
Direct pumping system, Taunton, Mass. VI 67 (1891–92).
Eternal vigilance the price of good water. IX 147 (1894–95).
Handling fires while changing mains. X 230 (1895–96).
Laying a 16-inch main across a stream. IX 103 (1894–95).
Service-pipe defects and their remedy. XII 41 (1897–98).
Sixteen-inch direct river pipe, Taunton, Mass. VI 179 (1891–92).

CHANDLER, CHARLES E.
State control of dams and reservoirs. XXVI 173 (1912).
Stream flow data. XXII 409 (1908).
Stream flow data from water-power standpoint. XXI 464 (1907).

CHANDLER, HAROLD C.
Operation of rapid sand-filters, Cambridge, Mass. (with M. C. Whipple). XLI 218 (1927).

CHAPLIN, WINFIELD S.
Water in Japan. I Dec. 20 (1886–87).

CHASE, E. SHERMAN
Copper sulphate treatment, Rockport, Mass. XXXVIII 48 (1924).

CHASE, E. SHERMAN.—*(Continued).*
Dangers to sanitary water-quality. XXXVII 16 (1923).
Filtration plant, Greenwich Water Co., Greenwich, Conn. XLII 396 (1928).
Sanitary scoring of water supplies. XXXIX 229 (1925).

CHASE, H. M.
Displacement pumps driven by Diesel engines. XXXVII 163 (1923).

CHASE, HARVEY S.
Depreciation in water-works accounts. XXIV 305 (1910).

CHASE, JOHN C.
Covered reservoir, Albany, Ga. VIII 155 (1893–94).
Standpipe, Wilmington, N. C. VIII 68 (1893–94).
Water rates. XVII 174 (1903).

CHASE, W. G.
Reinforced concrete pipe. XXXVI 102 (1922).

CHOATE, CHARLES F., JR.
Riparian water rights and diversion suits. XXIV 187 (1910).

CHURCH, S. R.
Tars. XXXVI 571 (1922).

CLAPP, FREDERICK O.
Color of waters, Scituate Reservoir, Providence, R. I. XL 530 (1926).

CLAPP, SIDNEY K.
Forestation of watersheds. XXX 64 (1916).

CLARK, HARRY W.
Copper sulphate and filtration. XIX 503 (1905).
Disinfection, an adjunct to purification. (with S. de M. Gage). XXIII 302 (1909).
Double filtration. XXIV 585 (1910).
Double filtration, South Norwalk, Conn. XXX 86 (1916).
Effect of pipes of different metals on water quality. XLI 31 (1927).
Filters charged with aluminum or ferric hydroxide. XXXVI 385 (1922); XXXVIII 84 (1924).
Filtration. XIV 82 (1899–1900).
Iodine and water supplies. XXXIX 204 (1925).
Iodine in Massachusetts supplies. XLII 132 (1928).
Iron removal from ground waters. XI 277 (1896–97).
Removal of color, organisms and odor. XVII 1 (1903).
Stream pollution by manufacturing wastes. XV 500 (1900–01).
Typhoid and Massachusetts water supplies. XXXIV 203 (1920).

CLARKE, E. W.
Water supply, Panama. XXVI 1 (1912).

CLASSON, W. G.
Emergency water supply, Leominster, Mass. (with C. W. Sherman). XXXIX 450 (1925).

CODD, WILLIAM F.
Connecting lead services. IX 187 (1894–95).
Filter, Nantucket, Mass. VIII 171 (1893–94).

COFFIN, FREEMAN C.
Cast-iron pipe. XV 38 (1900–01).
Covered reservoirs. XIV 252 (1899–1900).
Financial management of water works. XI 63 (1896–97).
Friction in force mains. X 234 (1895–96).
Gas, gasoline and oil engines for pumping machinery. XIII 206 (1898–99).
Meter rates. XVIII 55 (1904).
Standard pipe flanges. VI 48 (1891–92).
Standpipes. VII 202 (1892–93).

COGGESHALL, R. C. P.
Anchor ice. x 266 (1895–96).
Fall of water tower, Fairhaven, Mass. xv 522 (1900–01).
Leak in main pipe. xxi 487 (1907).
Log book for electrically-driven pump, New Bedford, Mass. xxxii 173 (1918).
Portable platform for trenching. ix 125 (1894–95).
Reservoir cleaning, New Bedford, Mass. iv 210 (1889–90).
Temporary dam, New Bedford, Mass. iii 200 (1888–89).

COLE, EDWARD S.
Water-consumption statistics. xxv 66 (1911).

COLLINS, MICHAEL F.
Filter operations, Lawrence, Mass. (with M. Knowles and A. D. Marble). xxii 193 (1908).
Lawrence filter. xvii 288 (1903).

CONARD, WILLIAM R.
Cast-iron pipe specifications. xxi 54, 367 (1907).
Fire hose, water pressures and hydrant spacings. xxxix 79 (1925).
Insulation of pipe joints. xxvii 228 (1913).
Manganese bronze for valve stems. xxxvi 32 (1922).
Manufacture and inspection of cast-iron pipe. xxxv 205 (1921).

CONANT, H. F.
Standpipe, Attleboro, Mass. xxix 179 (1915).

COOK, BYRON I.
Detecting water waste. vii 22 (1892–93).
Reservoir and dam, Woonsocket, R. I. xii 20 (1897–98).
Standpipes. xiv 124 (1899–1900).

COUCH, A. D.
Diesel engine pumping-equipment. xliv 458 (1930).

COULTERS, A. B.
Installation and care of Venturi meters. xliii 281 (1929).

COWAN, EDWARD H.
Detection and prevention of water waste, Marion, O. xviii 185 (1904).

CRAFTS, N. HENRY
Thickness of cast-iron pipe. iii 175 (1888–89).

CRAIG, EARL C.
Real estate and damage settlements, Scituate Reservoir, Providence, R. I. xl 503 (1926).

CRANDALL, FRANK H.
Assessment and collection of water rates. xiv 133 (1899–1900).
Charges for public use of large streams. xi 344 (1896–97).
Water loss from pipes. xii 245 (1897–98).
Water works, Burlington, Vt. x 150 (1895–96).

CRILLY, PATRICK F.
Cement pipe. v 50 (1890–91).

CROSBY, EVERETT U.
Eliminating the conflagration hazard. xv 97 (1900–01).

CUDDEBACK, ALLEN W.
Care and maintenance of meters. xxvii 471 (1913).

CULYER, THURSTON C.
Reforestation of Croton Watershed, New York, N. Y. xxx 69 (1916).

DANA, GORHAM
Private fire-protection and insurance rules. xxii 465 (1908).

DANFORTH, GEORGE C.
Military and emergency water-supplies. xli 129 (1927).

DANIELSON, W. A.
(With R. G. Tyler and M. LeBosquet, Jr.)
Loss of head in rapid sand-filters. xl 322 (1926).

DARLING, EDWIN
Filtration. iii 165 (1888–1889).
Water-works management. ii Sept. 7 (1887–88).

DAVIS, CARLETON E.
Water supply, Isthmus of Panama. xx 252 (1906).

DAVIS, F. A. W.
Air lift. xiii 51 (1898–99).
Electrolysis. xv 225 (1900–01).

DAVIS, W. E.
Moving a conduit. v 125 (1890–91).

DAVIS, WILLIAM MORRIS
Causes of rainfall. xv 338 (1900–01).

DEAN, F. W.
Economy of pumping engines. xviii 25 (1904).
Pumping engines. viii 85 (1893–94).
Pumping engine, Waltham, Mass. (with C. T. Main). xiv 171 (1899–1900).
Pumping-station practice. xlii 109 (1928).
Specifications for pumping engines, St. Louis, Mo. xi 172 (1896–97).
Steam boilers. xxxvi 155 (1922).

DEAN, PAYNE
Electrification of gate valves. xxxvi 264 (1922).

DE CROW, D. A.
Unaflow pumping engine. xxxiii 535 (1919); xxxiv 195 (1920).

DENNETT, R. C.
Reliability features of electrically-operated pumping stations. (with G. L. Swan). xli 268 (1927).

DES BAILLETS, CHARLES J.
McTavish Pumping Station, Montreal, Que. xliii 32 (1929).

DEWING, ARTHUR S.
Economic advantages of private ownership of water companies. xli 63 (1927).

DEYOE, D. H.
Pipe welding. xlii 25 (1928).

DICKERMAN, ALBERT C.
East Providence Water Company. xliii 239 (1929).
East Providence Water Company, rate case. xliii 246 (1929).

DITTOE, W. H.
Typhoid epidemic, Salem, O. xxxv 335 (1921); xxxvi 262 (1922).

DIVEN, J. M.
Double-disk type of valve. xxx 106 (1916).

DIXON, G. GALE
Corrosion of 36-in. steel force main, Akron, O. xxxvi 157 (1922).

DOANE, ALFRED O.
Pumping stations, Metropolitan Water Works, Boston, Mass. XLI 183 (1927).
Purchase of coal on efficiency basis. XXIV 277 (1910).
Steam pumping-engines. XXXII 121 (1918).
Water-pressure regulators. XX 1 (1906).

DOLE, RICHARD B.
Waters of the Great Lakes, quality. XXIII 254 (1909).

DONALDSON, WELLINGTON
Developments in water purification. XLII 372 (1928).

DONNELLY, RICHARD V.
Chlorination. XLII 79 (1928).

DOTEN, LEONARD S.
Water tower and standpipe, Fort Revere, Hull, Mass. XIX 33 (1905).

DROWN, THOMAS M.
Aëration of natural waters. VII 96 (1892–93).
Analysis of water. IV 79 (1889–90).
Electrical purification of water. VIII 183 (1893–94).
Filtration of natural waters. V 91 (1890–91).
Odor and color of surface waters. II March 3 (1887–88).
Purification of water by freezing. VIII 46 (1893–94).

DUDLEY, ARTHUR W.
Wood pipe in New Hampshire. XXX 318 (1916).

EATON, HARVEY D.
Extension of the water-district idea in Maine. XXXI 196 (1917).
Maine water districts and appraisals. XIX 147 (1905).

EDDY, HARRISON P.
Hydrogen-ion concentration in water purification. XXXV 385 (1921).

EDWARDS, LE ROY
Pipe-line welding by oxy-acetylene gas. XLII 3 (1928).

EGLEE, CHARLES H.
Hollow concrete dams. XXII 20 (1908).
Personal character and practical efficiency. XXIX 214 (1915).

ELLIS, GEORGE A.
Discharge of mains as determined by pressure gage. I Sept. 19; Dec. 18 (1886–87).
Fire protection by direct high-pressure pumps. VII 27 (1892–93).

ELLMS, JOSEPH W.
Copper sulphate for the purification of hard and turbid waters. XIX 496 (1905).

ELDREDGE, E. D.
Economy in pipe lines for small water works. XXXIV 91 (1920).
Magnetic dipping-needle for locating service and gate boxes. XXVIII 294 (1914).

ELWOOD, FREDERICK T.
Water works, Rochester, N. Y. XXIV 492 (1910).

FAIR, GORDON M.
Flush valve. XXXV 137 (1921).
Hydraulic service-characteristics of small pipes. (with M. C. Whipple and C. Y. Hsiao). XLIV 499 (1930).

FANNING, JOHN T.
Hydraulic pumping machinery. I Sept. 34 (1886–87).

FARNHAM, ELMER E.
Water hammer. VI 57 (1891–92).

FARWELL, C. A.
Granville Dam, Westfield, Mass., Design. XLIII 164 (1929).

FAXON, W. L.
Drinking fountains. V 111 (1890–91).

FELTON, CHARLES R.
Water supply, Brockton, Mass. XX 385 (1906)

FERGUSON, R. E.
Testing large meters. XLIII 382 (1929).

FIELD, FREDERICK E.
Filtration works, Montreal, P. Q. XXXIX 213 (1925); (with J. H. Harrington). XLII 359 (1928).

FIELD, GEORGE W.
Eels in water works. XV 390 (1900–01).

FINNERAN, GEORGE H.
Emergency gang in water service. XXX 413 (1916).
Leaks and litigation. XLI 201 (1927).
Pipe-jointing compounds. XXXVII 84 (1923).
Practical water-works matters. XXXIV 272 (1920).
Solid-wedge valve, Boston, Mass. XXX 101 (1916).

FISHER, EDWIN A.
Rochester, N. Y. XXIV 473 (1910).

FITZGERALD, DESMOND
Capacity of Sudbury River and Lake Cochituate reservoirs. II Dec. 12 (1887–88).
Catskill supply, New York, N. Y. XXXII 393 (1918).
Croton Aqueduct. III 161 (1888–89).
Rainfall available for water supply. I Sept. 41 (1886–87).
Sinking-fund tables. VI 185 (1891–92).

FLENTJE, M. E.
Unusual methods of water purification. XLIII 38 (1929).

FLINN, ALFRED D.
Protection of steel pipes, Catskill Aqueduct, N. Y. XXV 345 (1911).

FORBES, FAYETTE F.
Algæ in reservoirs and ponds. IV 196 (1889–90).
Automobile for business. XXII 38 (1908).
Cement-lined service pipes. XV 44 (1900–01).
Chara fragilis (experience). X 252 (1895–96).
Compulsory meterage, Brookline, Mass. XX 247 (1906).
Covered reservoir, Brookline, Mass. VIII 113 (1893–94).
Driven wells. V 141 (1890–91).
Driven wells, Brookline, Mass. XI 195 (1896–97).
Frictional head in a force-main. VI 164 (1891–92).
Improvement in pumping engines. XIII 157 (1898–99).
Lead poisoning. XV 58 (1900–01).
Taste and odor imparted to water by some algæ and infusoria. VI 90 (1891–92).

FORBES, HOWARD C.
Electrolysis of water pipes. (with C. A. Stone). IX 25 (1894–95).

FOSTER, E. H.
Superheated steam in pumping engines. XIX 76 (1905).

FOSTER, JOEL
Fire protection: how paid? XII 270 (1897–98).

FOSS, WILLIAM E.
Break in hydraulic turbine, Clinton, Mass. XXXIII 143 (1919).

FOWLER, CHARLES E.
Slow sand-filter, Poughkeepsie, N. Y. XII 209 (1897–98).

FREEMAN, JOHN R.
Arrangement of hydrants and water pipes for fire protection. VII 49, 152 (1892–93).
Bursting of the Portland Reservoir. VIII 148 (1893–94).
Fire streams. IV 95 (1889–90).

FRENCH, A. M.
Water supply, Holyoke, Mass. XVIII 396 (1904).

FRENCH, A. N.
Small water-works laboratory. XXXII 64 (1918).

FRENCH, ARTHUR N.
Meter registration. XXI 33 (1907).

FRENCH, EDWARD V.
Desirable hydrant pressure. XXV 247 (1911).
Fire-service meters. XIX 291 (1905).
Loss of pressure caused by meters in fire supplies. XII 73 (1897–98).

FUERTES, E. A.
Hydraulic laboratory, Cornell University. XIV 195 (1899–1900).

FULLER, FRANK L.
Covered reservoir, Franklin, N. H. V 160 (1890–91).
Covered reservoirs. XXIII 204 (1909).
Covering reservoir, Natick, Mass. XVII 383 (1903).
Laying 10-in. pipe, Leicester, Mass. IV 190 (1889–90).
Life of service pipes. VII 221 (1892–93).
Sinking-fund tables. XII 103 (1897–98).
Testing distribution systems. XI 330 (1896–97).
Water works, Franklin, N. H. VII 82 (1892–93).
Water works, Ware, Mass. II Sept. 49 (1887–88).
Water works, Webster, Mass. IX 240 (1894–95).
Well supply, Waltham, Mass. VI 183 (1891–92).

FULLER, GEORGE W.
Relative applicability of sand and mechanical filters. XIV 32 (1899–1900).

FULLER, HARRY U.
Sebago Lake intake and conduit, Portland, Me. (with L. Metcalf and C. B. Mitchell). XXXIX 354 (1925).
Submarine pipe lines, Portland, Me. XXXVII 298 (1923); XLIV 479 (1930).

FULLER, MYRON L.
Ground waters for public supplies. XXVII 233 (1913).

FULLER, WESTON E.
Loss of head in bends. XXVII 509 (1913).

FULTON, CREED W.
Pumps for small water works. XXXIV 1 (1920).

GAGE, STEPHEN DE M.
Disinfection, an adjunct to purification. (with H. W. Clark). XXIII 302 (1909).
Public water supplies of Rhode Island. XL 117 (1926).

GAITENBY, JOHN W.
Operation of mechanical filtration plant, Evanston, Ill. XXXI 619 (1917).

GALE, JAMES M.
Water works, Glasgow, Scotland. XIV 240 (1899–1900).

GANZ, ALBERT F.
Electrolysis. XXXI 280 (1917).

GARDNER, EDWIN P.
Light for night work. VII 168 (1892–93).

GARDNER, L. H.
Complaints. V 129 (1890–91).

GARRATT, J. E.
Copper sulphate treatment of reservoirs and effect on filter runs, Hartford, Conn. XXXVI 522 (1922).
Grouting rock foundations of dams, Hartford, Conn. XXXI 609 (1917).

GARRETT, JESSE
Making cast-iron pipe. XI 27 (1896–97).

GEAR, PATRICK
Care of gates and hydrants. XXVIII 298 (1914).
Leakage detection. XXVIII 68 (1914).

GERHARD, WILLIAM PAUL
Driven wells, Mt. Washington Hotel, N. H. XVIII 247 (1904).
Water service and fire protection of theaters. IX 77 (1894–95).

GERRISH, WILLIAM B.
Water-softening plant, Oberlin, O. XIX 422 (1905).

GIBBS, HARRY F.
Small pumping stations. XVI 167 (1902).

GIBSON, J. E.
Elevated tank, Charleston, S. C. XLI 277 (1927)

GIDLEY, HENRY T.
Fire in office and shop of the Fairhaven Water Company. XL 29 (1926).

GIFFORD, FRANK J.
Electric thawing machine. XXXIV 114 (1920).

GLOVER, ALBERT S.
Water-works records. IV 69 (1889–90).

GOLDSMITH, CLARENCE
Cast-iron pipe joints, Boston, Mass. XXVIII 113 (1914).
Fire, Salem, Mass. (with F. A. McInnes) XXIX 94 (1915).
Reasonable requirements for fire protection. XXVI 305 (1912).
Water supply in semi-arid regions of the U. S. XXVI 144 (1912).

GOODNOUGH, X. HENRY
Boating and fishing in reservoirs. XXXIV 151 (1920).
Copper sulphate for algæ control. XIX 525 (1905).
Examination of public water supplies. XIV 65 (1899–1900).
Extension of the Metropolitan Water District, Boston, Mass. XXXVI 189 (1922).
Rainfall in New England. XXIX 237 (1915); XXXV 228, 397 (1921); XL 178 (1926); XLIV 157 (1930).
Rainfall in New England storm of Nov. 3–4, 1927. XLII 150 (1928); XLIV 119 (1930).
Water supply of Southeastern Massachusetts. XXXVI 527 (1922).

GOODRICH, L. W.
Forestry. XXIV 345 (1910).

GORMAN, ARTHUR E.
Watching the weather in safeguarding water supplies. XLIII 377 (1929).

GOSS, WILLIAM F. M.
"Snow" pumping engine, Indianapolis, Ind. XIII 49 (1898–99).

GOULD, JOHN A.
Recording gages. V 65 (1890–91).

GOW, CHARLES R.
Quartermaster terminal, Boston, Mass. XXXII 362 (1918).
Quicksand. XXXIV 171 (1920).

GOW, FREDERIC W.
Cement-lined pipe. 113 (Trans. 1885).
High-service pipe river-crossing. XII 195 (1897–98).

GOWING, EARLE H.
Back-filling trenches. XII 173 (1897–98).
Crossing a stream with a main pipe. V 135 (1890–91).
Reducing pressure on a gravity system. XVII 139 (1903).
Standard specifications for water works. VI 168 (1891–92).

GRAHAM, JAMES W.
Portland Water District, Portland, Me. XLIII 364 (1929).

GRIFFIN, S. P.
Laying a 30-inch supply main. VI 186 (1891–92).

GRIMES, E. L.
Water works, Troy, N. Y. XXII 164 (1908).

GRISWOLD, F. M.
Standard hose couplings. XXXIV 63 (1920).
Standardization of threads for fire-hose couplings and fittings. XXXV 43 (1921).

GRISWOLD, H. W.
Maintenance of water meters. XLIII 273 (1929).
Nepaug Dam, Hartford, Conn. XXXI 603 (1917).

GWINN, DOW R.
Instructions to employees at pumping stations and filter plants. XXXIV 284 (1920).

HAGUE, CHARLES A.
Electrical pumping plant. X 184 (1895–96).

HAINE, WILLIAM
Control of microscopic organisms. XXXII 10 (1918).

HALE, FRANK E.
Control of microscopic organisms. XLIV 361 (1930).

HALE, RICHARD A.
Tubercles in iron and steel penstocks. X 244 (1895–96).
Water rights. XXI 248 (1907).

HALL, FRANK E.
Street mains. 107 (Trans. 1885).

HALL, HARRY R.
Water disinfection in Maryland. (with R. B. Morse). XXX 301 (1916).

HALL, JOHN O.
Modern plumbing. XV 525 (1900–01).
Municipal management of water-supply systems. XVII 9, 338 (1903).

HALL, RODNEY D.
Diesel oil engines and displacement pumps. XXXVII 159 (1923).
Steam *vs.* oil. XXXVII 182 (1923).

HAMMATT, E. A. W.
Back-filling trenches. XII 160 (1897–98).

HANCOCK, JOSEPH C.
Risks of single supply main. VI 59 (1891–92).
Water hammer on main pipes. V 11 (1890–91).

HANSEN, PAUL
Phenol tastes, Marquette, Mich. XXXIX 320 (1925).

HARBESON, J. P., JR.
Diesel engine in a modern forge. XXXIX 138 (1925).

HARRINGTON, JOHN H.
Filtration works, Montreal, Que. (with F. E. Fields). XLII 359 (1928).

HARRINGTON, JOHN L.
Experience with a sand blast. III 166 (1888–89).
Siphon under Broad Canal, Cambridge, Mass. VII 90 (1892–93).

HASKELL, JOHN C.
Cement-lined pipes. VII 171 (1892–93).
Electrolysis, Lynn, Mass. X 278 (1895–96).
Pumping-engine foundation, Lynn, Mass. V 163 (1890–91).
Pure water from surface supply. XI 137 (1896–97).
Reducing excessive consumption. IX 231 (1894–95).
Surface-water supplies of Massachusetts. XIII 79 (1898–99).
Water supply at fires. VII 47 (1892–93).
Water supply, Lynn, Mass. X 55 (1895–96).

HASSAM, WALTER E.
Distributing reservoir, Worcester, Mass. XII 153 (1897–98).

HASTINGS, LEWIS M.
Flow of water in a compound pipe. VIII 189 (1893–94); IX 58 (1894–95).
Loss of water power by diversion. VII 187 (1892–93).
Rainfall and run-off in New England. XVIII 32 (1904).
Relining Payson Park Reservoir, Cambridge, Mass. XLII 45 (1928).
Steel for water mains. XIII 314 (1898–99).
Uses of rainfall records. XXXIII 72 (1919).
Vital statistics, Cambridge, Mass. XX 406 (1906).
Water works, Cambridge, Mass. XI 121 (1896–97).

HATHAWAY, ALFRED R.
Municipal water-works administration. XXXVII 88 (1923).

HATHAWAY, JAMES M.
Collecting water rates. II Sept. 68 (1887–88).

HATTON, T. CHALKLEY
Construction and failure of Austin, Pa., dam. XXVI 262 (1912).

HAVILL, H. T.
Pump-slip tests. XXIX 511 (1915).

HAWES, LOUIS E.
Spring-water supply. XI 156 (1896–97).
Water supply, Provincetown, Mass. XI 285 (1896–97).

HAWES, WILLIAM M.
Placing walking-beam in steamer *Puritan*. III 163 (1888–89).

HAWLEY, WILLIAM C.
Leadite joints. XXIX 563 (1915).
Meterage, Atlantic City, N. J. XII 111 (1897–98)
Waterproofing the concrete lining of reservoirs XVIII 176 (1904).

HAYES, F. H.
Deposit of certified check. XXIX 143 (1915).

HAZEN, ALLEN
Additions to New England water works. XXXVII 233 (1923).
European water supplies. IX 109 (1894–95).
Filter sands. VII 165 (1892–93).
Filtration plant, Albany, N. Y. XIV 291 (1899–1900).
Massachusetts water reports. XL 44 (1926).
Physical properties of water. XVII 21 (1903).
Sanitary protection of water supplies. XXXV 297 (1921).
Thickness of large pipe lines. XXV 29 (1911).

HEERMANS, HARRY C.
Bulletin for water users, Hoquiam Water Co. XXII 462 (1908).

HEFFERNAN, DAVID A.
Detecting pipe-leakage. XXXII 204 (1918).
Reminiscences of a superintendent. XLII 235 (1928).
Service pipes and plumbing appliances. XXXVII 47 (1923).
Suggestions to water-works officials. XXXIV 183 (1920).
Thawing frozen services. XXXII 138 (1918).
Water consumption, Milton, Mass. XXVIII 290 (1914).
Water distribution in connection with plumbing and corrosion. XXXV 123 (1921).

HENDERSON, LAWRENCE J.
Water and life. XXVIII 1 (1914).

HERING, RUDOLPH
Additional water supply, New York City. XVIII 360 (1904).

HERSCHEL, CLEMENS
Damages by diversion of water power. XXI 241 (1907).
Public works and state boundaries. XLI 331 (1927).
Tests of articles of commerce. X 109 (1895–96).
Water works, East Jersey Water Co. VIII 18 (1893–94).

HIGGINS, DANIEL J.
Calking joints with compressed air. XXVIII 286 (1914).

HIGGINS, HERMAN K.
Water supply and filtration, Panama. XXV 454 (1911).

HILL, NICHOLAS S., JR.
Pipe-extension charges. XXXV 91 (1921).
Water supply, Tampa, Fla. XL 128 (1926).

HILL, WILLIAM R.
Removing organisms from reservoir, Syracuse, N. Y. XIV 213 (1899–1900).
Some things that should be done in constructing a system of water works. XIII 36 (1898–99).
Steel submerged pipe, Syracuse, N. Y. VIII 40 (1893–94).

HODGMAN, BURT B.
Pipe cleaning. XXXIX 171 (1925).

HOLDEN, HORACE G.
Curb box. I Sept. 41 (1886–87).
Inequalities in water rates. IV 213 (1889–90).
Iron service-pipe connections. VI 81 (1891–92).
Laying 24-in. main under Nashua River. XII 254 (1897–98).
Water meters. III 154 (1888–89).
Water supply, Nashua, N. H. XVI 249 (1902).

HOLLIS, FREDERICK S.
Chlamydomonas in Spot Pond. (with H. N. Parker). XIV 26 (1899–1900).
Color and its relation to the character of the water. XIII 94 (1898–99).
Removing organisms from water. XIV 221 (1899–1900).

HOLLIS, IRA N.
Economy in use of coal. XVII 32 (1903).
Fuel situation in New England. XXXII 217 (1918).

HOLMQUIST, C. A.
Control of water supplies, New York State. XLI 261 (1927).
Water-supply improvements and intestinal diseases. XXXVIII 237 (1924).

HONNESS, GEORGE G.
Sanitary improvement of a large watershed. XXIX 502 (1915).

HOOK, G. S.
Electric pumping, Schenectady, N. Y. XX 89 (1906).

HOOPER, ELMER G.
Location of leak in submarine pipe line. XXIX 536 (1915).

HORNE, H. W.
Additional water supply, Hartford, Conn. XXXI 588 (1917).

HORTON, ROBERT E.
Adjustment of diversion damages by storage compensation. XXII 334 (1908).
Mean precipitation on drainage basin. XXXVIII 1 (1924).
Measurement of precipitation. XXXIII 14 (1919).
Watershed leakage in gravity supplies. XXXIII 306 (1919).

HORTON, THEODORE
Supervision of public water supplies by New York State Department of Health. XXXIII 545 (1919).

HOUGH, LAURENCE C.
Distribution systems. XLI 14 (1927).

HOWARD, CHARLES D.
Water-supply sanitation in New Hampshire. XXXI 237 (1917).

HOWARD, JOHN L.
Fells Reservoir, Metropolitan Water Works, Boston, Mass. XV 20 (1900–1901).

HOWARD, NORMAN J.
Chlorine studies and taste production. (with R. E. Thompson). XL 276 (1926); XLI 59 (1927).
Drifting-sand filtration, Toronto, Ont. XXXIII 504 (1919).

HOWE, FREELAND, JR.
Action of water on pipes. XXII 43 (1908).

HOWLAND, J. HASTINGS
Standardization of fire-hose threads. XXXVIII 73 (1924).

HOXIE, F. J.
Locating leaks in water mains. XXVII 307 (1913).

HSIAO, C. Y.
Hydraulic service-characteristics of small metallic pipes. (with G. M. Fair and M. C. Whipple). XLIV 499 (1930).

HUY, H. F.
Woodlawn Pumping Station, Western New York Water Co., Buffalo, N. Y. XLIII 387 (1929).

JACKSON, DANIEL D.
Asterionella. (with G. C. Whipple). XIV 1 (1899–1900).
Destruction of typhoid germs and algæ by copper sulphate. XIX 483, 563 (1905).

JACKSON, JAMES F.
Great ponds as water supplies. III 203 (1888–89).

JACKSON, J. FREDERICK
Enforcement of sanitary laws. XLIII 402 (1929).
Stream pollution affecting industrial uses. XXXVI 14 (1922).
Stream pollution in Connecticut. XXXI 627 (1917).

JAHNKE, C. B.
Diesel engine, overall economy. XXXIX 105 (1925).

JANIN, GEORGE
Water works, Montreal, Que. XVII 272, 378 (1903).

JENNINGS, F. H.
Improvements in filtration, Watertown, N. Y. XXXIX 68 (1925).

JOHNSON, GEORGE A.
Copper-sulphate treatment of sewage. XIX 506 (1905).
Rapid sand-filtration. XXXI 390 (1917).
Rapid sand-filtration, Cambridge, Mass. XXXVII 339 (1923).

JOHNSON, F. P.
Basin and well covering, Waltham, Mass. VIII 120 (1893–94).

JOHNSON, R. F.
Underground records. XXXVI 95 (1922).

JOHNSON, W. E.
Water works, Hartford, Conn. XXXI 575 (1917).

JOHNSON, WILLIAM S.
Effect of meters on water consumption. XXI 109 (1907).
Ground-waters as sources of supply. XXIII 401 (1909).
Municipal water-works financing in Massachusetts. (with C. W. Sherman and H. A. Symonds). XXX 279 (1916).
Small water-works systems. XXVIII 144 (1914).
Things domestic meters do not accomplish. XXVI 40 (1912).

JONES, E. R.
Frost protection of pipes. III 125 (1888–89).

JORDAN, FRANK C.
Rate of income for domestic service by different classes of residential property. XXIV 592 (1910).

KELLOGG, ROYAL S.
Forest conservation. XXII 389 (1908).

KEMBLE, F. T.
Coöperation of water-works operators with the public and employees. XXXVI 363 (1922).

KENNISON, KARL R.
Decolorization by storage. XLIII 60 (1929).

KENNY, W. R.
Chlorine determination by ortho-tolidin. (with F. R. McCrumb). XLII 410 (1928).

KIERAN, PATRICK
Water tank, Fall River. II Sept. 26 (1887–88).

KIERSTED, WYNKOOP
Water supply. V 83 (1890–91).

KILLAM, SAMUEL E.
Breaks in water mains. XXXI 268 (1917).
Disappearance of cast-iron-pipe coating during storage. XXXV 367 (1921).
Meterage results, Metropolitan Water Supply, Boston, Mass. XXXI 495 (1917).

KIMBALL, FRANK C.
Testing 6-in. meters. XVII 305 (1903).
Water emergency and water supply, Worcester, Mass. XXVI 113 (1912).

KIMBALL, GEORGE A.
Recording location of mains and services. VIII 157 (1893–94).
Stealing water. IV 187 (1889–90).

KING, GEORGE A.
Direct pumping, Taunton, Mass. XIX 21 (1905).
Merging water department with other municipal departments. XXXVI 434, 612 (1922).
Survey of water-works activities in 1910. (Presidential address). XXV 161 (1911).

KINGSLEY, CHESTER W.
Construction and maintenance of water works. III 127 (1888–89).

KINNICUTT, LEONARD P.
Sewage treatment by bacterial methods. XV 119 (1900–01).

KITTREDGE, WALTER W.
Purification works, Providence, R. I. XL 522 (1926).

KNAPP, LOUIS H.
Water works, Buffalo, N. Y. XIV 206 (1899–1900).

KNIGHT, CHARLES W.
Flood-water channel, Altoona, Pa., reservoirs. XIV 151 (1899–1900).

KNOWLES, MORRIS
Experimental filters, Pittsburgh, Pa. XV 148 (1900–01).
Filter operations, Lawrence, Mass. (with M. F. Collins and A. D. Marble). XXII 193 (1908).
State regulation of public utilities. XXVI 272 (1912).
Water ejector for sand transportation. (with J. M. Rice). XXV 83 (1911).
Water supply investigations and construction, Lawrence, Mass. (with M. Mansfield and P. Nugent). XXXIX 345 (1925).

KNUDSON, ADOLPHUS A.
Electrolysis. XV 244 (1900–01).
Lead-covered cables, a cause of electrolysis. XXIII 164 (1909).

KRAEMER, HENRY
Metallic copper for the purification of drinking water. XIX 487 (1905).

KREBS, ADOLF
Replacing castings and forgings by steel elements cut to shape by automatic machines. XLII 36 (1928).

KRÖHNKE, B.
Sterilization of surface water by chemical methods. XIX 551 (1905).

KUICHLING, EMIL
Discharge of conduits, Rochester, N. Y. XIII 138 (1898–99).
Steel pipes. XXIV 514 (1910).

LAASE, WILLIAM F.
Water supply, Brooklyn, N. Y. XXIX 546 (1915).

LABOON, JOHN F.
Filter plant, Wheeling, W. Va. XXXIX 291 (1925).

LALLY, THOMAS E.
Inspection of equipment. XXXVI 450 (1922).
Small gate or valve in larger pipe line. XXXIV 302 (1920).

LANEY, C. C.
Rochester parks. XXIV 482 (1910).

LANHAM, PAUL
Water-waste prevention surveys. XXXIII 287 (1919).

LARNED, EDWARD S.
Swamp drainage. XVI 36 (1902).
Testing and use of Portland and natural cements. XXI 1 (1907).

LEARNED, WILBUR F.
Ashland Basin No. 4 and the mixing and handling of concrete, Boston, Mass. II Dec. 3 (1887–88).

LEAVITT, ERASMUS D.
Pumping engines. IX 163 (1894–95).

LEBOSQUET, MAURICE, JR.
Loss of head in rapid sand-filters. (with R. G. Tyler and W. A. Danielson). XL 322 (1926).

LEDOUX, J. W.
Air in gravity mains. XXXV 31 (1921).
Water-supply mains. XXXV 354 (1921).

LEIGHTON, MARSHALL O.
Conservation of water resources. XXII 381 (1908).
Engineering construction by the United States Reclamation Service. XX 127 (1906).
Governmental regulation of water powers. XXIV 259 (1910).

LESAGE, THOMAS W.
Service boxes, Montreal, Que. XVII 284 (1903).

LETTON, HARRY P.
Double municipal supplies. (with W. T. Sedgwick). XXV 440 (1911).
Operation of small water purification plants. XXVII 532 (1913).

LEVY, ERNEST C.
Kennebec Valley typhoid epidemic, 1902–1903. (with G. C. Whipple). XIX 163 (1905).

LITTLE, BEEKMAN C.
Water works, Rochester, N. Y. XXIV 485 (1910).

LOCHRIDGE, ELBERT E.
Intermittent application of coagulant, Springfield, Mass. XXXI 48 (1917).
Water works, Springfield, Mass. XXI 279 (1907).

LOCKE, AUGUSTUS W.
Water in Holland, 1887. V 44 (1890–91).

LOCKE, WILLIAM W.
Sanitary inspection, Metropolitan Water Works, Boston, Mass. XV 483 (1900–01).

LONGLEY, FRANCIS F.
Coolgardie pipe line, Australia, and correction of its corrosion. XXXIX 421 (1925).
Reinforced-concrete pressure pipe. XXXVIII 257 (1924).
Water supplies, American Expeditionary Forces. XXXIII 465 (1919).
Water supply, Salem–Beverly, Mass. XXX 35 (1916).

LOONEY, EDWARD J.
Explosion of hot-water boiler, Belmont, Mass. XXXIV 200 (1920).

LORETZ, ARTHUR J. L.
Pumping engines. XI 226 (1896–97).

LUCEY, P. J.
Water works and rainfall and stream flow, Holyoke, Mass. XXXIV 323 (1920).

LUCKE, CHARLES E.
Diesel oil-engine for water-works service. XXXVII 145 (1923).

MAIN, CHARLES T.
Fuel situation in New England. XXXII 231 (1918).
Pumping engine, Waltham, Mass. (with F. W. Dean). XIV 171 (1899–1900).
Values of water powers and damages by diversion. XXI 214 (1907).

MALLORY, F. B.
Poisonous effects of copper. XLI 27 (1927).

MANSFIELD, MYRON G.
Sand-embankment dam, Chicopee, Mass. XLI 244 (1927).
Water-supply investigations and construction, Lawrence, Mass. (with M. Knowles and P. Nugent). XXXIX 345 (1925).

MARBLE, ARTHUR D.
Filter operations, Lawrence, Mass. (with M. Knowles and M. F. Collins). XXII 193 (1908).

MARSH, CLARENCE W.
Making chlorine at point of consumption. XXXVI 1 (1922).

MARSH, FRANCIS B.
Scituate Dam, Providence, R. I. XL 477 (1926).

MARSTON, FRANK A.
Hydrant connections for fire engines. XXXVII 369 (1923).
Standpipe, Gloversville, N. Y. XXXVI 288 (1922).

MASON, WILLIAM P.
Copper sulphate as a disinfectant. XIX 481 (1905).
Drinking water and disease. VI 139 (1891–92).
Explosion of septic tank, Saratoga, N. Y. XXI 23 (1907).
Intensity of typhoid and character of water carriage. XIX 412 (1905).
Swimming pools. XXXIII 258 (1919).
Typhoid epidemic, Maidstone, England. XXIV 299 (1910).

MATHEWS, NATHAN
Why municipal water works are not self-supporting. IX 1 (1894–95).

MAZZUR, FRANK A.
Pumping equipment for economy. XXXVII 242 (1923).

McCLINTOCK, W. E.
Water-pipe trenches *vs.* good roads. VIII 71 (1893–94).

McCUNE, C. A.
Metallurgy of welding-wire. XLII 33 (1928).

McCRUMB, F. R.
Chlorine determination by ortho-tolidin. XLI 386 (1927); (with W. R. Kenny). XLII 410 (1928).

McCURDY, H. S. R.
Hydraulic fill dams, Miami Conservancy District, O. XXXIII 389 (1919).

McINNES, FRANK A.
High-pressure fire system, Boston, Mass. XXXVI 483 (1922).
Salem fire. (with Clarence Goldsmith). XXIX 94 (1915).
Salt-water fire system, Boston, Mass. XIII 304 (1898–99).
Thawing frozen service pipes by electricity. XVIII 214 (1904).
Waste restriction, Boston, Mass. XXXV 34 (1921).

McKENNA, JAMES A.
Pumping stations, Providence, R. I. XL 466 (1926).

McKENZIE, THOMAS
Standpipe, Westerly, R. I. XXIX 169 (1915).

McKIBBEN, FRANK P.
State supervision of dams and reservoirs. XXVI 242 (1912).

McMURRY, JAMES A.
Metering Boston, Mass. XXIX 73 (1915).
Meter setting and maintenance. XXXVII 44 (1923).

McWANE, J. R.
Cast-iron service-pipe. XXXVIII 79 (1924).
Manufacture and use of small cast-iron pipe. XLIV 495 (1930).

MENDELL, JAMES H.
Pumping equipment, Manchester, N. H. XXXII 169 (1918).

MERRILL, FRANK E.
Grounding electric-light wires on water pipes. XXIII 180 (1909).
Public watering stations. XXVIII 357 (1914).

MERRILL, GEORGE F.
Booster pump for gravity supply. XXXVII 190 (1923).
Water works, Greenfield, Mass. XXIX 149 (1915).

METCALF, LEONARD
Control of public utility companies by public service commissions. (Presidential address). XXX 160 (1916).
Depreciation. XXIV 442 (1910).
Distributing reservoir, Dayton, O. (with W. T. Barnes). XXXIII 219 (1919).
Echo Lake Dam, Milford, Mass. XVII 146 (1903).
Groined-arch roofs. XVII 398 (1903).
Sebago Lake intake and conduit, Portland, Me. (with H. U. Fuller and C. B. Mitchell). XXXIX 394 (1925).
Wrought-iron cement-lined pipe. XXIII 1 (1909).

MEYERHERM, C. F.
Electrolysis investigations. XLIII 143 (1929).

MIDDLETON, R. E.
Making watershed-areas and sanitary districts coterminous. XIII 119 (1898–99).

MILLER, EDWARD F.
Waste-heat engines. XVII 44 (1903).

MILLER, HIRAM A.
Additional water supply, Pittsfield, Mass. XXVII 337 (1913).

MILLIGAN, ROBERT E.
Mechanical filtration plant, Newport, R. I. XXV 60 (1911).

MILLS, HIRAM F.
Control of inland waters by Massachusetts State Board of Health. I March 6 (1886–87).
Filter, Lawrence, Mass. IX 44 (1894–95).
Typhoid fever and water supplies. V 149 (1890–91).

MITCHELL, CHARLES B.
Sebago Lake intake and conduit, Portland, Me. (with L. Metcalf and H. U. Fuller). XXXIX 394 (1925).

MITCHELL, R. W.
Concrete pipe. XLIII 18 (1929).

MOAT, CHARLES P.
Quality of public water supplies of Vermont. XV 514 (1900–01); XXXVII 291 (1923).

MOLDENKE, RICHARD
Engineering aspects of cast iron. XXXVII 1 (1923).

MOORE, GEORGE T.
Copper sulphate as an algicide. XIX 474 (1905).

MOORE, JOHN J.
Raising water rates to offset increased costs. XXXII 248 (1918).

MORAN, JOHN W.
Water works, Gloucester, Mass. XXV 381 (1911).

MORSE, C. H.
Electrolysis. VII 139 (1892–93).

MORSE, ROBERT B.
Water disinfection in Maryland. (with H. R. Hall). XXX 301 (1916).

MOSTELLER, W. P.
Selling from the manufacturer's and purchaser's viewpoints. XXXVIII 287 (1924).

MOULTON, DAVID E.
Organization of Portland Water District, Portland, Me. XLIII 359 (1929).
Water supply, Portland, Me. XXXI 199 (1917).

MOWRY, CHARLES W.
Fighting fires beforehand. XLI 413 (1927).

MULHALL, JOHN F. J.
Water-works accounting. XIX 395 (1905).

MURDOCH, WILLIAM
Cleaning water mains, St. John, N. B. XIII 147, 333 (1898–99).
Wooden joints in cast-iron mains. XV 34 (1900–01).

MURRAY, ALBEUS P.
Reading meters, billing and collecting revenue, Providence, R. I. XL 457 (1926).

MYERS, C. J.
Wood-stave conduit, Atlantic City. XVIII 387 (1904).

MYOTT, E. B.
Construction of Granville Dam, Westfield, Mass. XLIII 175 (1929).

NELSON, FRED B.
Distribution problems. XLIII 133 (1929).
Testing meters. XXIX 539 (1915).

NEVONS, HIRAM S.
Experience with a 30-inch gate. IV 212 (1889–90).

NEWCOMB, CHARLES L.
Hydrant experiments. XXI 378 (1907).

NEWSOM, REEVES J.
Economy of service-pipe installation. XXXVI 79 (1922).
Modernizing an established water-works system, Lynn, Mass. XXXIV 139 (1920).
Office methods and regulations. XXXIV 264 (1920).
Pumping-station design and operation. XXXV 46 (1921).

NICHOLS, PHILIPS
Law governing the taking of private property. XXXVIII 327 (1924).

NILES, WILLIAM H.
Secular and local variations of weather and climate affecting water supply. V 74 (1890–91).

NOLAN, S. FRANK
Distribution and maintenance, Providence, R. I. XL 460 (1926).

NOLTE, AUGUST G.
Covering service-reservoirs for filtered or ground water. (with G. C. Bunker). XXXVII 261 (1923).

NORTHROP, FRANK L.
Water filter, Milford, Mass. X 262 (1895–96).

NOYES, ALBERT F.
Driven wells. I June 19 (1886–87).
Excavating in quicksand. IV 218 (1889–90).
Metropolitan water supply of Massachusetts. X 117 (1895–96).
Water hammer in house plumbing. 62 (Trans. 1885).
Weight of cast-iron pipe. 28, 154 (Trans. 1885).

NUGENT, PATRICK
Water supply investigations and construction, Lawrence, Mass. (with M. Knowles and M. G. Mansfield). XXXIX 345 (1925).

NYE, JOSEPH K.
Water works, Fairhaven, Mass. VIII 175 (1893–94).

OLMSTED, FREDERICK L.
Landscape problems of Spot Pond Reservoir, Boston, Mass. XV 272 (1900–01).

ORCHARD, WILLIAM J.
Chlorination of New England water supplies. XXXVI 99 (1922).

OTIS, JOHN C.
Water works, Poughkeepsie, N. Y. XXIII 283 (1909).

PALMER, MARSHALL B.
Water supply, Syracuse, N. Y. XXXVIII 226 (1924).

PARKER, F. H.
High-service motor, Burlington, Vt. II Sept. 63 (1887–88).

PARKER, HORATIO N.
Chlamydomonas in Spot Pond, Boston, Mass. (with F. S. Hollis). XIV 26 (1899–1900).

PARRISH, EDWARD
Atlantic intra-coastal waterways. XXV 285 (1911).

PEASE, HERBERT D.
Flies and disease. XXV 17 (1911).
Water supplies and Health Department of New York State. XXIII 90 (1909).

PECK, ERMON M.
Meters and water consumption, Hartford, Conn. XXII 282 (1908).

PELLETIER, JOSEPH C.
Civil service and the water department. XXIII 209, 355 (1909).

PERRY, FRED G.
Recording pressure-gages. X 255 (1895–96).

PHILLIPS, VICTOR B.
Electrolysis on steel force-main, Akron, O. XXXVI 170 (1922).

PIRNIE, MALCOLM
Aëration in water purification. XLIII 395 (1929).

PITCHER, FRANK H.
Pumping by electricity, Montreal, Que. XVII 349 (1903).

POOL, CHARLES L.
Sanitation in New Hampshire. XXXVIII 122 (1924).

PORTER, DWIGHT
Hydraulic laboratory, Massachusetts Institute of Technology. VIII 81 (1893–94).

PORTER, HOLBROOK F. J.
Steel forgings for pumping engines. XII 120 (1897–98).

POTTER, ALEXANDER
Economy of circular reinforced-concrete reservoir construction. XXVI 138 (1912).

POWELL, S. T.
Ozone as a sterilizing agent. XXIX 87 (1915).

PRATT, ARTHUR H.
Core wall, Wanaque Dam, N. J. XXXVI 457 (1922).
Wanaque water-works project. XLIV 386 (1930).

PRATT, GILBERT H.
Chlorine control apparatus for sterilization of water supplies. XXXVIII (1924).
Uses and abuses of water filtration. XXVI 341 (1912).

PRIDE, EDWIN L.
Water-works accounting. XXXI 63 (1917).

PROVOST, ANDREW J., JR.
Protection of New York's water supply from pollution during construction work. XXV 301 (1911).

PURDY, J. H.
Fire protection for factories. XVIII 193 (1904).

RANE, FRANK W.
Reforestation of watersheds. XXV 234 (1911).

RAYMOND, WILLIAM G.
Damages to mill powers, Troy, N. Y. XIII 152 (1898–99).
Power capacity of stream without storage. XXII 184 (1908).

RECKLINGHAUSEN, MAX VON
Ultra-violet rays for water purification. XXIX 202 (1915).

REID, WILLIAM A.
Clearing and grubbing Scituate Reservoir, Providence, R. I. XL 499 (1926).

REYNOLDS, IRVING H.
Pumping-engine practice of the Edward P. Allis Co. XIII 172 (1898–99).

RICE, JOHN M.
Water ejector for transporting sand. (with M. Knowles). XXV 83 (1911).

RICE, L. FREDERICK
Test of water meters, Boston, Mass. III 67, 120 (1888–89).

RICHARDS, GRAGG
Rainfall of Northern New England. XLII 431 (1928); XLIII 50 (1929); XLIV 74, 165 (1930).

RICHARDS, HENRY
Slow sand-filter, Gardiner, Me. XXXI 216 (1917).

RICHARDS, WALTER H.
Accident on tile conduit. III 164 (1888–89).
Efficiency in water-works management. XXV 407 (1911).

RICHARDS, WALTER H.—*(Continued).*
High-service system, New London, Conn. VII 148 (1892–93).
Laying 20-inch main, New London, Conn. IV 178 (1889–90).
Meter rates. XXII 289 (1908).
Storage-reservoir construction, New London, Conn. XVIII 67 (1904).
Service pipe. 40 (Trans. 1884).

RIDGWAY, ROBERT
Hudson River crossing, Catskill Aqueduct, N. Y. XXV 317 (1911).

ROBERTSON, R. A.
Venturi meter. VII 32 (1892–93).

ROGERS, EDWIN H.
Sub-surface collecting system and water quality, Newton, Mass. XXXVII 312 (1923).

ROGERS, HENRY W.
Filtration of water. 54 (Trans. 1884).
Water works, Lawrence, Mass. I Dec. 6 (1886–87).

ROSA, EDWARD B.
Electrolysis and its mitigation. XXIX 49 (1915).

ROULLIER, G. A.
Water meters. V 56 (1890–91).

RUGGLES, SYDNEY L.
Eliminating water hammer from a high-pressure regulating-valve. XXXVII 402 (1923).

SAMPSON, GEORGE A.
Improvement of water supply, Keene, N. H. (with R. S. Weston). XL 1 (1926).
Iron-removal plant, Amesbury, Mass. XLII 53 (1928).
Standpipe, Middleboro, Mass. XXX 251 (1916).

SANDS, WILL J.
Pumping machinery, Metropolitan Water Works, Boston, Mass. XV 299 (1900–01).
Trial of 30-m.g.d. pump, Metropolitan Water Works, Boston, Mass. XV 232 (1900–01).

SANDERS, PERCY R.
Automatic chlorination, Concord, N. H. XLIII 399 (1929).
Electric pumping, Concord, N. H. XXXVI 517 (1922).

SAVILLE, CALEB M.
Color and other phenomena of water from an unstripped reservoir, Hartford, Conn. XXXIX 145 (1925).
Color reduction in storage reservoirs. XLIII 416 (1929).
Compensating reservoirs and water diversion. XL 352 (1926).
Cleaning mains, Hartford, Conn. XXVII 489 (1913).
Financing main-pipe extensions by assessment. XXXIX 185 (1925); XL 22 (1926).
Floods and droughts in New England. XXXIX 1 (1925).
Interstate water rights. XLI 340 (1927).
Pipes and pipe-laying, Metropolitan Water Works, Boston, Mass. XVII 203 (1903).
Repairs to lining of small reservoir, Chelsea, Mass. XIX 66 (1905).
Reservoir and standpipe, Quincy, Mass. XVI 177 (1902).
Selection of meters. XXXII 329 (1918).
Use and discard of auxiliary fire-protection from a polluted source. XXXVI 392 (1922).
Water ram in distribution system, Hartford, Conn. XXVII 183 (1913).
Water-works experiences, Hartford, Conn. XXX 195 (1916).

SAVILLE, THORNDIKE
Nature of color in water. XXXI 78 (1917).
Water supply, Caracas, Venezuela. XLII 303 (1928).

SAWYER, ALBERT L.
Classified cash book. XXXI 54 (1917).
Legislation and court decisions for sanitary protection of water supplies. XXXII 154 (1918).
Old aqueduct, Haverhill, Mass. XXII 442 (1908).

SCHNEIDER, WILLIAM J.
Copper and brass water services. XLIII 148 (1929).
Copper and health. XLIV 485 (1930).

SCOTT, WARREN J.
Cross-connections in Connecticut. XLI 365 (1927).
Laws and regulations for the protection of public water supplies. XL 425 (1926).
Public water supplies of Connecticut. (with F. O. A. Almquist). XLIII 298 (1929).

SEDGWICK, WILLIAM T.
Biological water-analysis. II June 7 (1887–88); IV 50 (1889–90).
Double municipal supplies. (with H. P. Letton). XXV 440 (1911).
From peace to war, victory and just judgment. XXXII 189 (1918).
Organisms causing odors and tastes. XIV 54 (1899–1900).
Protection of surface waters from pollution. XI 245 (1896–97).
Protection of water supplies from pollution by railroads. XX 427 (1906).
Responsibility for causation of typhoid. (with C.-E. A. Winslow). XX 51 (1906).
Sand filtration. VII 103 (1892–93).
Sanitary condition of water supply, Burlington, Vt. X 167 (1895–96).
Surface water for drinking purposes. V 33 (1890–91).
Typhoid, Washington, D. C. XXV 470 (1911).
Water-supply sanitation, 19th century. XV 315 (1900–01).
Water supply sanitation, 19th and 20th century. XXX 183 (1916).

SENIOR, SAMUEL P.
Water works, Bridgeport Hydraulic Company. Bridgeport, Conn. XXXV 309 (1921).

SEYMOUR, CHARLES W. S.
Anchor ice in a recording pressure-gage. IX 223 (1894–95).

SHAUGHNESSY, J. F.
Phelps Brook Dam, Hartford, Conn. XXXII 39 (1918).

SHAW, ARTHUR L.
Electric pumping station, Kennebec Water District, Waterville, Me. XXXIX 32 (1925).

SHEDD, J. HERBERT
Compressed air. XIX 1 (1905).
Requisite amount of water for a public supply. XVIII 1 (1904).

SHERMAN, CHARLES W.
Bending 10-in. cast-iron pipe. XXVII 27 (1913).
Cement-lined cast-iron pipe. XL 98 (1926).
Cleaning and painting standpipes. XXXV 51 (1921).
Early log pipe, Boston, Mass. XLI 216 (1927).
Economy of municipal bonds for water-works construction. XL 15 (1926).
Emergency water supply, Leominster, Mass. (with W. G. Clarson). XXXIX 450 (1925).
Grouting or cushioning standpipe bases. XXX 131 (1916).
Municipal water-works financing in Massachusetts. (with W. S. Johnson and H. A. Symonds). XXX 279 (1916).
Protecting iron and steel standpipes from corrosion. XXXIII 272 (1919).

SHERMAN, CHARLES W.—(*Continued.*)
Revenue and operating expenses of municipally-owned water works, Massachusetts, 1913. xxx 260 (1916).
Siphon operation on main supply pipe. (with W. R. Brann). xxxv 36 (1921).
Term of water-works bonds. xxxvi 589 (1922).
Tuberculation of cast-iron pipe. xli 259 (1928).
Typhoid epidemic, Plymouth, Pa., 1885. xli 23 (1927).
Water consumption. xxxvi 273 (1922).
Water ram. xxvii 169 (1913).
Water-works practice abroad. xl 297 (1926).

SHERMAN, EDWARD C.
Water sterilization plant, Wakefield, Mass. xxx 135 (1916).

SHERMAN, WILLIAM B.
Precision. xvii 52 (1903).
Pumping capacity and maximum consumption. iii 90 (1888–89).
Water consumption, 1886. ii March 35 (1887–88).

SICKMAN, ALBERT F.
Water power, Holyoke, Mass. xviii 337 (1904).

SIDDONS, JOSEPH S. V.
Torresdale filter plant, Philadelphia, Pa. (with F. D. West). xxvii 337 (1913).

SIEMS, V. BERNARD
Design of distribution systems. (with D. B. Biser). xliii 284 (1929).
Metropolitan district for Baltimore County, Md. xxxviii 250 (1924).

SKINNER, JOHN F.
Cobbs Hill Reservoir, Rochester, N. Y. xxiv 498 (1910).
Protection of catchment areas. xliii 1 (1929).
Sources of supply, conduits and reservoirs, Rochester, N. Y. xxxviii 219 (1924).

SMITH, ARTHUR H.
Leakage from lead joints in cast-iron pipe. xxx 1 (1916).

SMITH, ERASTUS G.
Mississippi River as a source of water supply. xix 215 (1905).

SMITH, GORDON Z.
Control of water waste by house-to-house inspection. xxxv 322 (1921).

SMITH, HERBERT E.
Toxicology of copper for water treatment. xix 491 (1905).

SMITH, HUBERT B.
Pitot tube for water-flow and pressure studies. xliv 471 (1930).

SMITH, JOHN E.
High- and low-duty pumping engines. xiv 163 (1899–1900).

SMITH, J. WALDO
Catskill water supply, New York, N. Y. xxix 481 (1915).
Schoharie development, New York, N. Y. xxxiii 257 (1919).

SMITH, LEONARD C. S.
Diesel engine in a pumping plant. xxxix 135 (1925).

SMITH, THEOBALD
Water-borne diseases. x 203 (1895–96).

SMITH, WILSON F.
Kensico Reservoir, New York, N. Y. xxix 486 (1915).

SNELL, GEORGE H.
Standpipe, Attleborough, Mass. (with F. A. Barbour). xx 302 (1906).

SOPER, GEORGE A.
Ozonization of water. xv 1 (1900–01).
Typhoid epidemic, Ithaca, N. Y. xviii 431 (1904).
Typhoid epidemic, Watertown, N. Y. xxii 87 (1908).

SPEAR, WALTER E.
City tunnel and conduits, Catskill Aqueduct, New York, N. Y. xxvii 315 (1913).

SPELLER, F. N.
Corrosion. xxxix 90 (1925).
Matheson-joint steel mains. xxxii 58 (1918).

SPILLMANN, MAX
Centrifugal pumps for Diesel-engine drive. xxxvii 172 (1923).

SPOONER, HERMAN W.
Haskell's Brook Reservoir and Dam, Gloucester, Mass. xix 27 (1905).
Subaqueous pipe and electric cable way, Gloucester, Mass. xxii 261 (1908).

STACY, GEORGE A.
Hydrants. iv 32 (1889–90).
Location of broken main and examination of hydrants in cold weather. vii 222 (1892–93).
Pumping without an air chamber. xx 379 (1906).
Service gate-boxes. xi 339 (1896–97); xii 36 (1897–98).
Water works, Marlborough, Mass. xvi 139 (1902).

STEARNS, FREDERIC P.
Effect of storage upon water quality. v 115 (1890–91).
Selection of sources of water supply. vi 102 (1891–92).

STEARNS, RALPH H.
Decolorization of water by storage. xxx 20 (1916).

STETSON, T. M.
Watuppa Ponds for water supply of Fall River, Mass. i June 3 (1886–87).

STEVENS, FRED O.
Efficiency of pipe-jointing compounds. xxxiv 102 (1920).
Mechanical filtration, Putnam, Conn. xxxviii 103 (1924).
Steam pump, 35 years old. xxxvii 12 (1923).

STEVENS, JOHN C.
Beauty — an investment. xliii 370 (1929).

STONE, CHARLES A.
Electrolysis of water pipes. (with H. C. Forbes). ix 25 (1894–95).

STORRS, HARRY A.
Electrolysis. x 33 (1895–96).

STORY, CARROLL F.
Ludlow filters, Springfield, Mass. xxiii 229 (1909).

STORY, STEPHEN B.
Meter reading and billing, Rochester, N. Y. xxxix 71 (1925).

SULLIVAN, WILLIAM F.
Tests of large meters and fire-service devices, Lowell, Mass. xix 264 (1905).
Water uses difficult to control. xxviii 377 (1914).

SUTER, RUSSELL
Control of public water supplies by Conservation Commission, New York State. XXIX 520 (1915).

SWAIN, GEORGE F.
Comparing economy of structures of different classes. II March 32 (1887–88).
Influence of forests upon rainfall and stream flow. I March 11 (1886–87).

SWAN, CHARLES H.
Covered reservoirs. III 45 (1888–89).

SWAN, G. L.
Reliability features of electrically-operated pumping stations. (with R. C. Dennett). XLI 268 (1927).

SWARTS, GARDNER T.
Difficulties in water purification. XXV 191 (1911).
Water purification. XIII 1 (1898–99).

SWEETSER, ROBERT C.
Leptomitus in drinking water. XXVII 282 (1913).

SYMONDS, HENRY A.
Court decisions in purchase of Braintree Water Supply Co. XXXVI 426 (1922).
Engines in small water works. XXXIII 153 (1919).
Leadite joints. XXIX 557 (1915).
Municipal water-works financing in Massachusetts. (with C. W. Sherman and W. S. Johnson). XXX 279 (1916).

TALBOT, BENJAMIN
Linings and covering for water pipes. XL 446 (1926).

TAYLOR, LUCIAN A.
Dam, Woodbridge, Conn. VI 51 (1891–92).
Dam, Quincy, Mass. III 167 (1888–89).
Reservoir embankments. VIII 130 (1893–94).
Tapping band on cast-iron pipe. IX 229 (1894–95).
Water-meter experience. VI 182 (1891–92).
Water meters. I Sept. 57 (1886–87).
Water works, Newport, N. H. XII 145 (1897–98).

TAYLOR, STEPHEN H.
Machinery *vs.* hand labor in pipe-laying. XXXIX 445 (1925).
Water supply, New Bedford, Mass. XXXVI 370 (1922).

TERZAGHI, CHARLES
Soil studies for Granville Dam, Westfield, Mass. XLIII 191 (1929).

THOMAS, HARRY L
Producer-gas plant, Hingham, Mass. XXII 1 (1908).

THOMAS, ROBERT J.
Standard specifications for water meters. XXX 430 (1916).
Water works, Lowell, Mass. XXVII 1 (1913).

THOMPSON, G. WILBUR
Plumbers and water-works superintendents. XXXV 107 (1921).

THOMPSON, RUDOLPH E.
Chlorine studies and taste production. (with N. J. Howard). XL 276 (1926).

THOMPSON, SANFORD E.
Collapse of filter roof, Lawrence, Mass. XXII 237 (1908).

THOMSON, JOHN
Accuracy of meters. VIII 58 (1893–94).
Testing water meters. X 77 (1895–96).

TIGHE, JAMES L.
Municipal water-supply revenue. XVIII 352 (1904).
Odors and tastes, Holyoke, Mass. XXIII 324 (1909).

TILDEN, J. A.
Repairs to wrought-iron pipe main. III 202 (1888–89).

TOUMEY, J. W.
Forestry in relation to public water supplies. XXXI 247 (1917).

TOWER, D. N.
Air in a tube-well pumping plant. XII 189 (1897–98).
Water supply, Cohasset, Mass. XXIX 160 (1915).

TRAUTWINE, JOHN C., JR.
Water purification, Philadelphia, Pa. XXII 419 (1908).

TREMBLAY, J. A.
Water works, Quebec, Que. XXXIX 208 (1925).

TRIBUS, LOUIS L.
Water-works construction and litigation, Newton, N. J. XXIII 145 (1909).

TRYON, JAMES E.
What a water-supply engineer can do in the fire department. IX 93 (1894–95).

TUBBS, J. NELSON
Municipal supply not to operate motors. VI 152 (1891–92).

TURNER, HOMER R.
Operating problems of a small water department. XXXI 633 (1917).

TURNER, JAMES V.
Foundations of Scituate Dam, Providence, R. I. XL 517 (1926).

TYLER, RICHARD G.
Fineness modulus for filter sands. XXXIX 239 (1925); XL 24 (1926).
Loss of head in rapid sand-filters. (with W. A. Danielson and M. LeBosquet, Jr.). XL 322 (1926).

UNDERWOOD, WILLIAM L.
Mosquitoes. XVIII 161 (1904).

VAN GILDER, LINCOLN
High-pressure fire system, Atlantic City, N. J. XXXIV 146 (1920).

VENNER, JOHN
Municipal use and waste of water. XVII 268 (1903).

VOGELSON, J. O.
Mortality rates in relation to water supply, Philadelphia, Pa. XXVIII 127 (1914).

WADDELL, THEODORE N.
Financing municipal water-supply enterprises. XXXVIII 321 (1924).

WADSWORTH, LEWIS L.
Water supply, Madison, Anson, and Emden, Me. XXXI 207 (1917).

WAGNER, BERNARD M.
Rates for water supply. XXIX 1 (1915).

WALDEN, A. E.
Construction of dams. XXVIII 268 (1914).

WALKER, CHARLES K.
Difficulties in water-works management. XI 341 (1896–97).
High-service reservoir, Manchester, N. H. X 66 (1895–96).
Lime to thaw pipes. VII 220 (1892–93).
Portable boiler for pipe-thawing. XVIII 217 (1904).

WALKER, WILLIAM H.
Prevention of red-water plague. XXXIV 33 (1920).
Relative corrosion of iron and steel pipe. XXVI 7 (1912).

WALSH, JOHN H.
"Universal" cast-iron pipe. XXXI 490 (1917).

WASTENEYS, HARDOLPH
Purification experiments, Brisbane, Australia. XXV 422 (1911).

WATSON, HAROLD
Changes in power for pumping, Newport, R. I. XLIII 410 (1929).

WEBER, J. HENRY
New England rainstorm, Nov. 3–4, 1927. (with C. F. Brooks). XLII 91 (1928); XLIV 106 (1930).
Rainfall of New England. XLII 137, 278, 291, 414 (1928); XLIV 6, 19, 32, 45, 57 (1930).

WELLS, GEORGE L.
"Wyckoff" water pipe. XIII 288 (1898–99).

WELLS, GEORGE M.
Water purification plant, Miraflores, C. Z. XXVIII 238 (1914).

WENTWORTH, FRANKLIN H.
Field engineering service, National Fire Protection Association. XLI 428 (1927).

WEST, FRANCIS D.
Torresdale filter plant, Philadelphia, Pa. (with J. S. V. Siddons). XXVII 358 (1913).

WEST, VERNON F.
Costs of lead substitutes for pipe joints. XXXVII 75 (1923).

WESTON, ARTHUR D.
Gastro-enteritis, Peabody, Mass., 1913. XXXIV 193 (1920).
Health laws relating to public water supplies of Massachusetts. XXXVIII 333 (1924).
Legal aspects of financial management of water works in Massachusetts. (Presidential address.) XLIII 328 (1929).

WESTON, EDMUND B.
High-pressure fire service, Providence, R. I XIII 85 (1898–99).
Mechanical filtration of water. XIV 333 (1899–1900).

WESTON, ROBERT S.
Auxiliary water supply, Brockton, Mass. XXX 324 (1916).
Corrosive action of water on metals. XXIV 559 (1910).
Cristatella in reservoir, Henderson, N. C. XIII 20 (1898–99).
Deferrization and demanganization of water. XXVIII 27 (1914).
Improvement in water supply, Keene, N. H. (with G. A. Sampson). XL 1 (1926).
Lead poisoning and its prevention. XXXIV 239 (1920).
Mechanical filter bottoms and strainer systems. XXXI 474 (1917).
Period of storage and microörganisms in reservoirs. XXXIX 225 (1925).
Purification of salt water. XXV 386 (1911).
Rubber pipe joints. XXII 310 (1908).
Water purification, New Orleans, La. XVII 27, 157 (1903).

WHEELER, RALPH N.
Wire fences and concrete posts, New York, N. Y. XXX 124 (1916).

WHEELER, WILLIAM
Cement for pipe-joints. XXXVII 62 (1923).
Sand filter, Ashland, Wis. XI 301 (1896–97).

WHERRY, WILLIAM M.
Rate making. XL 249 (1926).

WHIPPLE, GEORGE C.
Asterionella. (with D. D. Jackson). XIV 1 (1899–1900).
Decarbonation of water supplies. XXVII 193, 445 (1913).
Growth of organisms in water pipes. XII 1 (1897–98).
Light and diatom growths. XI 1 (1896–97).
Plumbing regulations. XXXV 117 (1921).
Quality of Massachusetts water supplies. XXXVI 40 (1922).
Raphidomonas. XI 348 (1896–97).
Temperature of surface waters and growth of microörganisms. IX 202 (1894–95).
Typhoid epidemic, Cleveland, O., 1903–04. XX 266 (1906).
Typhoid epidemic, Kennebec Valley, Me., 1902–03. (with E. C. Levy). XIX 163 (1905).
Water supplies, New York Metropolitan District, N. Y. XIX 451 (1905).
Water supply, Geneva, Switzerland. (with A. Bétant). XXXV 19 (1921).

WHIPPLE, MELVILLE C.
Design and equipment of water-works laboratories. XLII 339 (1928).
Hydraulic service-characteristics of small metallic pipes. (with G. M. Fair and C. Y. Hsiao). XLIV 499 (1930).
Operation of rapid sand-filters, Cambridge, Mass. (with H. C. Chandler). XLI 218 (1927).
Review of 19th annual report, London Metropolitan Water Board. XL 33 (1926).

WHITNEY, JOHN C.
Care of water meters. IX 106 (1894–95).

WHITTEMORE, W. P.
High-water alarm for reservoirs. III 21 (1888–89).

WILCOX, DELOS F.
Regulation of private water companies, New York City. XXXI 550 (1917).

WILLIAMS, FREDERICK C.
Storage facilities, Pawtucket, R. I. XLIII 113 (1929).

WILLIAMS, GARDNER S.
Distribution systems. XIV 97 (1899–1900).

WILLIAMS, HENRY J.
Value of fuels. XIX 90 (1905).

WILLIAMSON, ALFRED
Electrically-operated valves. XXIX 507 (1915).

WILLIAMSON, E.E.
High-pressure fire system, Boston, Mass. XLI 194 (1927).

WINSLOW, CHARLES-EDWARD A.
Bacteriological water analysis. XV 459 (1900–01).
Responsibility for causation of typhoid. (with W. T. Sedgwick). XX 51 (1906).

WINSLOW, FREDERIC I.
Care of large watersheds. XXXVII 385 (1923).
Tunnel and subway construction, Boston, Mass. XXVI 328 (1912).

WINSLOW, GEORGE E.
Air in pressure gages. IX 248 (1894–95).
Effect of water hammer on cement-lined pipe. IV 191 (1889–90).
Hydrant outlets. V 26 (1890–91).
Water ram caused by direct-acting pumping engines. XV 493 (1900–01).
Water supply, Waltham, Mass. VIII 118 (1893–94).

WINSOR, FRANK E.
Water supply, Providence, R. I. XXXVI 323 (1922).

WINSOR, GEORGE A.
Grubbing Kensico Reservoir, New York, N. Y XXIX 554 (1915).

WISE, R. E.
Diversion conduit and waste works, Richards Corner Dam, New Hartford, Conn. XXXI 595 (1917).

WOLFE, THOMAS F.
Cast-iron Pipe Publicity Bureau. XL 245 (1926).

WOLMAN, ABEL
Municipal water and sewerage costs in Maryland. XLI 439 (1927).

WOOD, CHARLES R.
Sand-spun pipe. XXXIX 85 (1925).

WOOD, DANA M.
Water works, Greenwich Water Company, Greenwich, Conn. XLII 378 (1928).

WOOD, EDMUND
Water supply, New Bedford, Mass. XI 202 (1896–97).

WORTHEN, W. D.
Public-service regulation. XXXI 163 (1917).

WORTHINGTON, CHARLES C.
Worthington pumping machinery. XIII 229 (1898–99).

YOUNG, HENRY A.
Water works, Camaguey, Cuba. XXIII 264 (1909).

INDEX TO NEW ENGLAND WATER WORKS ASSOCIATION AFFAIRS.

AWARD OF DEXTER BRACKETT MEMORIAL MEDAL.

1916 Caleb Mills Saville. XXXI 648 (1917).
1917 Albert L. Sawyer. XXXIII 105 (1919).
1918 David A. Heffernan. XXXIII 357 (1919).
1919 Robert E. Horton. XXXIV 357 (1920).
1920 Robert Spurr Weston. XXXV 398 (1921).
1921 X. Henry Goodnough. XXXVI 478 (1922).
1922 Charles W. Sherman. XXXVII 324 (1923).
1923 George A. Johnson. XXXVIII 306 (1924).
1924 Robert E. Horton. XXXIX 276 (1925).
1925 John F. Laboon. XL 397 (1926).
1926 Caleb Mills Saville. XLI 293 (1927).
1927 H. W. Clark. XLII 458 (1928).
1928 Francis W. Dean. XLIII 321(1929).
1929 Robert A. Cairns. XLIV 534 (1930).

COMMITTEE REPORTS ON ASSOCIATION AFFAIRS.

Committee on badges for members: appointed June 17, 1886, I 81 (1886); report, IV 9, 15 (1889–90).
Committee on certificate of membership: appointed, XXVII 553 (1913).
Committee on convention funds rules: appointed, XXVIII 564 (1914); report, XXIX 235 (1915).
Committee on Dexter Brackett memorial: appointed, XXIX 471 (1915); report, XXIX 579 (1915); XXX 492 (1916); XXXI 1 (1917).
Committee on exchange of sketches: appointed, I Sept. 16 (1886); IV Sept. 9 (1889); reports, I Sept. 16 (1886); I March 27 (1887); II Sept. 22, 86 (1887); II Dec. 34 (1887); III Sept. 17 (1888).
Committee on headquarters: appointed, VI 11 (1891–92); report, X 11 (1895–96).
Committee on revision of the constitution: appointed, XIV 374 (1899–1900); report, XV 207 (1900–01).

CONSTITUTION.

Constitution and by-laws adopted June 21, 1882. 8 (Proc. 1882); 5 (Trans. 1883); 5 (Trans. 1884); 5 (Trans. 1885).
—Amendment of Article III. 165 (Trans. 1885); IV 177 (1889–90).
—Amendment of Article VII. XIII 74 (1898–99).
—Revision discussed. XV 207 (1900–01).
Constitution and by-laws adopted September 19, 1900. XV 298 (1900–01); XVI 1 (1902).
—Amendment of Section I. XIX 233 (1905).
—Amendment of Section II. XVII 421 (1903); XXXI 658 (1917).
—Amendment of Section III. XXIV 247 (1910).
—Amendment of Section IV. XIX 233 (1905).
—Amendment of Section V. XXIV 247 (1910).

GENERAL AFFAIRS AND ADDRESSES.

Address. (Robert E. Peary.) XXX 497 (1916).
Address and verses. (Olney Arnold.) 215 (Trans. 1885).
An appreciation of William T. Sedgwick. XX 94 (1906).
Affiliation of Technical Societies. XXXVI 311 (1922).
Badge adopted. IV 9, 15 (1889–90); VII 9 (1892–93).
Badge reproduced around a fountain below the Croton Dam. XIX 380 (1905).
Coöperation in publishing papers proposed by Association of Engineering Societies. IX 137 (1894–95).

GENERAL AFFAIRS AND ADDRESSES. — (*Continued*).

Deposit of funds. XIX 237 (1905); XXI 497 (1907).
Exchange of publications with N.E.W.W.A. XX 372 (1906).
Gavel presented by the American Water Works Association to N.E.W.W.A. IV 6 (1889–90); XVIII 311 (1904).
Gavel presented by J. C. Chase to N.E.W.W.A. XIX 119 (1905).
Headquarters established at Tremont Temple, Boston. XI 105 (1896–97). XI 277 (1896–97); (Discussion.) VI 11 (1891–92), X 11, 18 (1895–96); enlarged, XX 103 (1906).
Initiation fees remitted to members admitted to New England Water Works Association during 1915. XXIX 147, 230 (1915).
JOURNAL issued as the organ of the N.E.W.W.A. Salutatory. I Sept. 1 (1886–87); Issued quarterly. (Discussion.) II Sept. 85 (1887–88); Index authorized. XVI 401 (1902); XXVIII 110 (1914); Price of back numbers. XXII 259 (1908); XXV 284 (1911); Subscription allowance. XVII 421 (1903).
Letter to New England Water Works Association on retaining national forests under federal control. (Gifford Pinchot.) XXVII 156 (1913).
Library founded. X 148 (1895–96).
Mayor Malcolm E. Nichols Trophy Award. XLI 296 (1927).
New silver faucet: verses. (Desmond FitzGerald.) XVIII 481 (1904).
Presentation of cabinet to W. R. Hill. XII 191 (1899–1900);
Presentation of silver pitcher and goblet to W. M. Hawes. XVIII 321 (1904).
Presentation of watch to F. E. Merrill. XX 488 (1906).
Resolution of N.E.W.W.A. that national forests should be retained under national control. XXVII 297 (1913).
Sub-lease of N.E.W.W.A. headquarters. XVII 300, 302 (1903).
Water meter: verses. (J. B. Laying.) I Sept. 57 (1886–87).

HISTORICAL.

Reports of experience of members of N.E.W.W.A. (Table.) 89 (Trans. 1884).
Twenty years after — a retrospect. (R. C. P. Coggeshall.) XVI 271 (1902).
Up to 1885 — some reminiscences. (R. C. P. Coggeshall.) XVIII 300 (1904).

MEMOIRS OF DECEASED MEMBERS.

Andrews, Frank A. XX 233 (1906).
Atkinson, Edward. XX 124 (1906).
Bacon, James P. XXXV 197 (1921).
Bacot, R. C., Jr. XXIII 111 (1909).
Bagnell, Richard W. XXXII 181 (1918).
Baldwin, Charles Henry. XXXIII 138 (1919).
Ball, Phineas. IX 189 (1894–95).
Bancroft, Lewis M. XXXVIII 96 (1924).
Barbour, William S. III 143 (1888–89).
Barnes, Roland Dwight. XXXIII 137 (1919).
Batchelder, George E. XIII 349 (1898–99).
Batchelder, George W. XLIII 236 (1929).
Battles, James Monroe. XV 455 (1901).
Beals, Joseph E. XXIII 455 (1909).
Bickford, Nathan B. XV 206 (1900–01).
Bishop, George H. XXIII 456 (1909).
Boyce, W. C. IV 65 (1889–90).

MEMOIRS OF DECEASED MEMBERS.
—(*Continued*).

Brainard, C. M. VIII 195 (1893–94).
Brackett, Dexter. XXIX 592 (1915).
Broatch, John C. XVIII 245 (1904).
Brush, Charles B. XII 72 (1897–98).
Burke, James E. XVIII 334 (1904).
Burnham, William Winslow. XX 377, 492 (1906).
Burnie, James. XXXII 389 (1918).
Campbell, Charles H. XXIII 111 (1909).
Carpenter, George A. XLII 1 (1928).
Chadbourne, Edward J. XXXVII 338 (1923).
Chaffee, Fred I. X 140 (1895–96).
Chandler, Henry. XV 224 (1900–01).
Clark, Dennis W. XVIII 486 (1904).
Clark, Earn. XI 275 (1896–97).
Coffin, Freeman C. IX 493 (1906).
Coggeshall, Robert Carter Pitman. XXXVI 614 (1922).
Collins, Louis P. XXI 320 (1907).
Conant, Henry W. XIV 193 (1899–1900).
Cook, Henry A. XIX 142 (1905).
Coolidge, Samuel S. III 209 (1888–89).
Coryell, Martin. II Sept. 101 (1887).
Cotton, J. Warren. 83 (Trans. 1884).
Crehore, Charles F. VIII 108 (1893–94).
Crilly, Patrick F. XV 364 (1900–01).
Croes, John J. R. XX 234 (1906).
Curtis, George D. XVIII 334 (1904).
Davidson, James. VI 188 (1891–92).
Davis, F. A. W. XXIII 228 (1909).
Decker, John H. XV 455 (1900–01).
Dennett, Nathaniel. XIV 375 (1899–1900).
Dixon, William. VIII 108 (1893–94).
Doherty, Cornelius M. X 140 (1895–96).
Downey, William. XVI 247 (1902).
Drown, Thomas M. XVIII 489 (1904).
Dwyer, Bartholomew. XXIII 111 (1909).
Dyer, Charles R. VIII 195 (1893–94).
Eaton, Horace L. X 139 (1895–96).
Ellis, George A. XVIII 105 (1904).
Evans, Myron E. XXI 186 (1907).
Fales, Frank L. XIX 383 (1905).
Fanning, John T. XXVI 95 (1912).
Farnham, Irving T. XXII 376 (1908); XXIII 111 (1909).
Fels, August. XIX 383 (1905).
Forbes, Fred B. XLIII 237 (1929).
Fteley, Alphonse. XVIII 104 (1904).
Fuller, Frank E. XVI 247 (1902).
Fuller, Frank Louis. XXIV 138 (1920).
Gale, James M. XVII 303 (1903).
Garrett, Jesse. XIII 350 (1898–99).
Geer, Harvey M. XXXIII 215 (1919).
Gilderson, Dennis H. XXIV 341 (1910).
Glover, Albert Seward. XXXI 319 (1917).
Gould, Amos A. XXVI 95 (1912).
Gow, Frederic W. XXXV 88 (1921).
Gow, Robert M. VII 88 (1892–93).
Gowing, Earle Harley. XXIV 256 (1910).
Grannies, Sherman E. VIII 52 (1893–94).
Griswold, Florence M. XXXVI 472 (1922).
Grush, Benjamin S. VI 64 (1891–92).
Haberstroh, Charles E. XXXV 399 (1921).
Hall, Francis E. XLII 356 (1928).
Hague, Charles A. XXVI 95 (1912).
Hammond, Frank E. XXXVII 124 (1923).
Hancock, Joseph C. XVI 247 (1902).
Hapgood, Herbert L. XXXIV 320 (1922).
Harlow, Melles S. XV 298 (1900–01).
Harrington, John L. X 76 (1895–96).
Harris, Dwight A. XVIII 335 (1904).
Haskell, John C. XV 64 (1900–01).
Hastings, Valentine C. XXI 186 (1907).
Hatch, Edward L. XXXV 204 (1921).
Hathaway, Alfred R. XLIV 356 (1930).
Hawes, Louis E. XXV 187 (1911).
Hawes, William M. XII 292 (1897–98).
Hermany, Charles. XXII 85 (1908); XXIII 111 (1909).
Hill, Albert Banks. XLIV 355 (1930).
Hodgdon, Frank W. XXXVII 434 (1923).
Hodge, Thomas A. II March 36 (1887–88).
Holden, Andrew. XV 200 (1900–01).
Holden, Horace G. XVIII 319 (1904); XXVII 549, 554 (1913).
Horton, Sylvanus D. II June 27 (1887–88).
Hotchkin, George A. XVI 402 (1902).

MEMOIRS OF DECEASED MEMBERS.
—(*Continued*).

Hunking, Arthur W. XXII 499 (1908); XXIII 111 (1909).
Jenkins, George S. XV 224 (1900–01).
Jenks, Henry F. XVIII 487 (1904).
Kempton, David B. XIII 349 (1898–99).
Kennedy, Daniel. XLII 107 (1928).
Kimball, George Albert. XXVI 400 (1912).
Kinnicutt, Leonard Parker. XXV 187 (1911).
Kinsey, Harry H. XXXV 89 (1921).
Knapp, Louis H. XXVIII 97 (1924).
Knudson, Adolphus A. XXIII 455 (1909).
Laforest, J. O. A. XXII 499 (1908); XXIII 111 (1909).
Laing, William H. XV 456 (1900–01).
Leach, Samuel B. VI 145 (1891–92).
LeBaron, Eugene P. VIII 160 (1893–94).
Linsley, Jo H. XV 364 (1900–01).
Locke, Augustus W. VII 227 (1892–93).
Locke, James W. XXII 60 (1908).
Lockwood, Joseph A. XII 72 (1897–98).
Loretz, Arthur J. L. XXI 499 (1907).
Mann, Thomas W. XX 233 (1906).
Marion, J. A. XIX 142 (1905).
Martin, Alfred Earl. XXXVI 32 (1922).
Martin, Cyrus B. XVII 125 (1903).
Martin, Robert K. VIII 160 (1893–94).
Martin, T. P. XXXIII 218 (1919).
Mayo, John. XXXIII 566 (1919).
Mazsur, Frank A. XLI 474 (1927).
McCarthy, Daniel B. XXXIV 235 (1920).
McClellan, William C. III 99 (1888–89).
McCallum, A. R. XXVI 95 (1912).
McLaughlin, Thomas H. VIII 195 (1893–94).
Metcalf, Leonard. XL 421 (1926).
Miller, Alexander M. XVIII 488 (1904).
Mills, Hiram F. XXXVIII 98 (1924).
Morse, James W. XIV 193 (1899–1900).
Mulhall, John F. J. XXI 187 (1907).
Murdoch, Gilbert. IX 8 (1894–95).
Murphy, Charles F. XIV 193 (1899–1900).
Nason, William E. XI 275 (1896–97).
Nevons, Hiram S. IX 63 (1894–95); XVIII 309 (1904).
Nibecker, Claude P. XXII 500 (1908); XXIII 111 (1909).
Nichols, William R. I Dec. 27 (1886–87).
Noyes, Albert Franklin. XI 275 (1896–97).
Osborn, Weaver. VIII 195 (1893–94).
Otis, John P. K. XIX 143 (1905).
Paine, C. W. XXVI 95 (1912).
Parks, Charles F. XVII 303 (1903).
Pease, Aurelius G. XIX 586 (1905).
Pengilly, Lewis H. III 99 (1888–89).
Pierce, Charles E. XXXVI 616 (1922).
Pitman, William H. XXXVII 228 (1923).
Pope, Macy Stanton. XIX 144 (1905).
Pratt, Robert Winthrop. XXXIV 235 (1920).
Reed, Wilmer. XI 276 (1896–97).
Reynolds, Edwin. XXIII 142 (1909).
Rogers, Henry W. XV 365 (1900–01); XVIII 301 (1904).
Salisbury, Arnold H. XV 456 (1900–01).
Sears, Walter Herbert. XXV 405 (1911).
Sedgwick, William T. XXXV 197 (1921).
Seymour, Charles W. S. VIII 108 (1893–94).
Shirreffs, Reuben. XVIII 487 (1904).
Sprague, Phineas. II Dec. 35 (1887–88).
Stanwood, James Hugh. XI 275 (1896–97).
Stoddard, Samuel G. XV 457 (1901).
Stearns, Frederic Pike. XXXIV 28 (1920).
Stone, William M. XXXV 296 (1921).
Story, Carroll Fitch. XXIII 370 (1909).
Sweet, Kilburn S. XVIII 486 (1904).
Tarr, Richard L. XXXV 203 (1921).
Taylor, William D. VIII 195 (1893–94).
Thomas, William H. XXVI 95 (1912).
Tidd, Marshall M. X 76 (1895–96).
Tinkham, Samuel E. XXXVI 318 (1922).
Tucker, Herbert M. XXXVII 227 (1923).
Upton, Albert F. III 99 (1888–89).
Walker, Charles Kimball. XXVI 295, 303 (1912).
Washburn, Lettice Roderick. XXXIII 139 (1919).
Weld, F. Floyd. VI 64 (1891–92).
Wescott, George P. XVIII 488 (1904).
Wheeler, Elbert. XLIV 468 (1930).
Whidden, Hosea F. II March 36 (1887–88).

MEMOIRS OF DECEASED MEMBERS.
—(*Continued*).
Whittemore, W. P. XXVI 95 (1912).
Whittet, Rufus Mason. XXXIII 216 (1919).
Wilde, George E. XXII 376 (1908); XXIII 111 (1909).
Winship, Horace B. XIV 193 (1899–1900).
Wood, Irving Sparrow. XXXIV 90 (1920).
Woodburn, William F. XXXII 278 (1918).
Yates, Richard R. XII 72 (1897–98).
Young, Charles W. XXXV 202 (1921).

PORTRAITS.
Bagnell, R. W. XXII 354 (1908).
Barbour, Frank A. XXXVI. Frontispiece. (1922).
Batchelder, George E. XVIII 324 (1904).
Batchelder, George W. XXVI. Frontispiece. (1912).
Bowers, George. XIX 147 (1905).
Brackett, Dexter. XVIII 312 (1904).
Bristol, Theodore L. XL. Frontispiece. (1926).
Brooks, Edwin C. XVIII. Frontispiece. (1904).
Carpenter, George A. XLII. Frontispiece. (1928).
Chace, George F. XVIII 322 (1904).
Coggeshall, Robert C. P. XVI 282 (1902); XXII 354 (1908).
Cook, Byron I. XVIII 328. Plate XI (1904).
Crandall, Frank H. XVIII 328. Plate XII (1904).
Darling, Edwin. XVIII 308 (1904).
Ellis, George A. XVI 280 (1902).
FitzGerald, Desmond. XVIII 328 (1904).
Glover, Albert S. XXII 354 (1908); XXXI 320 (1917).
Graff, Frederick. XXII 426 (1908).
Hall, Frank E. XVI 278 (1902); XXII 354 (1908).
Haskell, John C. XVIII 328. Plate IX (1904).
Hazen, Allen. XXV. Frontispiece. (1911).
Heffernan, David A. XXXVIII. Frontispiece. (1924).
Holden, Horace G. XVIII 320 (1904); XXII 354 (1908).
Kent, Willard. XVIII 328. Plate X (1904).
Killam, Samuel E. XXXIII. Frontispiece. (1919).
King, George A. XXIV. Frontispiece. (1910).

PORTRAITS. — (*Continued*).
Latrobe, Benjamin Henry. XXII 418 (1908)
Lyon, James W. XVI 276 (1902).
Macksey, Henry V. XXXIV. Frontispiece. (1920).
Martin, Alfred E. XXII. Frontispiece. (1908).
McInnes, Frank A. XXVIII. Frontispiece. (1914).
Merrill, Frank E. XVIII 100 (1903).
Metcalf, Leonard. XXIX. Frontispiece. (1915).
Nevons, Hiram. XVIII 310 (1904).
Noyes, Albert Franklin. XI 275 (1896–97).
N.E.W.W.A.: Members present at twenty-first annual convention. XVI 284 (1902).
— Members present at twenty-fifth annual convention. XX 364 (1906).
— Surviving charter members, June 24, 1908. XXII 354 (1908).
Rogers, Henry W. XVI 284 (1902).
Roosevelt, Nicholas I. XXII 426 (1908).
Saunders, Percy R. XXXVII. Frontispiece. (1923).
Saville, Caleb M. XXXI. Frontispiece. (1917).
Sedgwick, William T. XX. Frontispiece. 94 (1906).
Sherman, Charles W. XXXV. Frontispiece. (1921).
Smith, J. Waldo. XXVII. Frontispiece. (1913).
Stacy, George A. XVIII 326 (1904).
Stearns, Frederic P. XXXIV 28 (1920).
Sullivan, William F. XXX. Frontispiece. (1916).
Taylor, Stephen H. XXXIX. Frontispiece. (1925).
Thomas, Robert J. XXIII. Frontispiece. (1909).
Walker, Charles K. XVII. Frontispiece. (1903); XXII 354 (1908).
Weston, Arthur D. XLIII. Frontispiece. (1929).
Weston, Robert S. XLIV. Frontispiece. (1930).
Winsor, Frank E. XLI. Frontispiece. (1927).

PROCEEDINGS.
Including reports of officers and standing committees of the Association, presidential addresses and special non-technical addresses.
See **EACH VOLUME OF THE JOURNAL.**

TECHNICAL COMMITTEE REPORTS.
See **SUBJECT INDEX.**

INDEX OF ADVERTISERS.

	Page
Ambursen Construction Co.	ii
Barrows, H. K.	ii
Conard, Wm. R.	ii
Fay, Spofford & Thorndike	ii
Hazen & Everett	ii
Hersey Mfg. Co.	iv
Leadite Co.	Back cover
Lock Joint Pipe Co.	vii
Metcalf & Eddy	ii
Neptune Meter Co.	v
New England Water Works Association	iii
Pitometer Co.	ii
Rensselaer Valve Co.	iii
Symonds & Stevens	ii
U. S. Cast Iron Pipe and Foundry Co.	x
Wallace & Tiernan	vi
Weston & Sampson	ii

HAZEN & EVERETT

Civil Engineers

C. M. EVERETT L. N. BABBITT

WATER WORKS

Design Construction Operation
Valuations Rates

25 West 43rd Street = New York City

METCALF & EDDY

ENGINEERS

Harrison P. Eddy
Charles W. Sherman
Almon L. Fales
Frank A. Marston
John P. Wentworth
Harrison P. Eddy, Jr.
Arthur L. Shaw
E. Sherman Chase

Water, Sewage, Drainage, Refuse and Industrial Wastes Problems

Laboratory Valuations

STATLER BUILDING BOSTON

WILLIAM R. CONARD

Amer. Soc. C. E. Amer. Soc. M. E.
A. S. T. M.

321 High St., Burlington, N. J.

Inspections and Tests of Materials

Reports Designs
Specifications

H. K. BARROWS

M. Am. Soc. C. E.

Consulting Hydraulic Engineer

Water Power, Water Supply, Sewerage, Drainage. Investigation Reports, Valuations, Designs, Supervision of Construction

BOSTON, MASS. 6 BEACON ST.

WESTON & SAMPSON

Consulting Engineers

Robert Spurr Weston George A. Sampson

Water Supply and Sewerage
Chemical and Bacteriological Laboratory

14 BEACON ST. - BOSTON, MASS.

SYMONDS & STEVENS

Consulting Engineers

70 State St., Boston, Mass.

WATER SUPPLY

Surveys — Estimates — Designs
Supervision

MANAGEMENT AND ORGANIZATION EFFICIENCY REPORTS

FAY, SPOFFORD & THORNDIKE

Engineers

Water and Sewerage Works

Investigations Reports Designs
Engineering Supervision Valuations

44 SCHOOL STREET BOSTON

THE PITOMETER COMPANY

ENGINEERS

Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Penstock Gaugings

50 Church Street New York City

AMBURSEN DAMS

Hydroelectric Developments
Water Supply and Irrigation Dams
DAMS ON DIFFICULT FOUNDATIONS

AMBURSEN CONSTRUCTION CO.
Incorporated

Room 2520, Grand Central Terminal Bldg., New York

Kansas City, Mo. Atlanta, Ga.

The "COREY" Hydrant

The **Corey** Fire Hydrants as built by us are the only **Genuine Corey Fire Hydrants** manufactured, and they conform to the standard specifications of the American Water Works Association.

Rensselaer

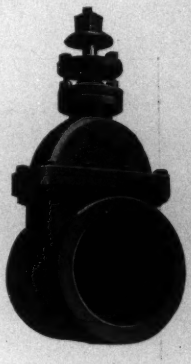
GATE VALVES

Furnished in any size for practically any working pressure for WATER, STEAM, GAS, OIL, etc.

Write for our new Catalog "G."

CHARLES L. BROWN,
New England Sales Manager,
Lock Box 2, Northboro, Mass.

Rensselaer Valve Company
Troy, N. Y.

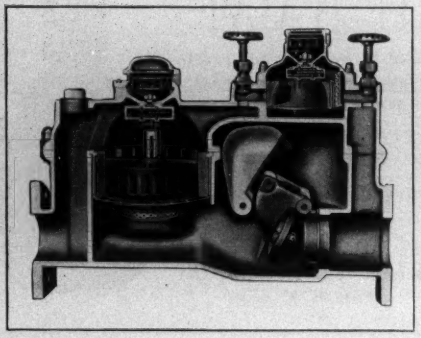


New England Water Works Association

Specifications, Forms, and Meter Rate Sheets

Standard Specifications for Cast-iron Pipe and Special Castings, per copy,		$0.25
Forms for Slow-sand Filtration Plants	per set,	0.30
Forms for Rapid-sand Filtration Plants	per set,	0.30
Meter Rate Sheets: Single sheet		0.05
100 sheets, in orange		2.50
100 sheets, in black		2.25

You can avoid this SERIOUS WASTE!



Interior view of the Hersey Compound Meter. Note the Counterbalanced Lever Valve. In full open position this valve offers no obstruction to the flow.

IF a compound meter is off a few percent it is a serious matter to your department.

Take the case of a 4-inch compound meter in a Massachusetts city. This meter when removed had registered 19,000,000 cubic feet. It was off 5% in accuracy. *Nearly a million cubic feet wasted!* Figure out the value of that loss if it had happened in your city.

The Hersey Compound Meter is the only meter with *no loss of accuracy at the "Cross Over"* point or throughout the entire range of flow. It is the *only* compound meter to use the exclusive patented "Counterbalanced Lever Valve" that assures full head of water, also it has the advantage of a single all bronze case.

Let us show you how a Hersey Compound Meter will save enough to pay for itself. By using Hersey Compound Meters you avoid the possibility of serious waste inherent in most compound meters. Write the nearest Branch Office.

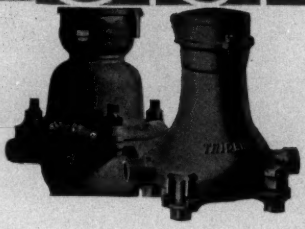
HERSEY MANUFACTURING COMPANY

HERSEY
WATER METERS

HERSEY MANUFACTURING COMPANY — *Main Office and Works:* Corner E and 2nd Sts., South Boston, Mass. *Branch Offices:* NEW YORK CITY, 290 Broadway; PORTLAND, ORE., 475 Hoyt St.; PHILADELPHIA, PA., 314 Commercial Trust Bldg.; ATLANTA, GA., 510 Haas-Howell Bldg.; DALLAS, TEXAS, 402 Praetorian Bldg.; CHICAGO, ILL., 10 South LaSalle St.; SAN FRANCISCO, CAL., 690 Market St.; LOS ANGELES, CAL., 450 East Third St.

NOTHING WILL DO BUT COMPLETE PRECISION

That your Water Works should produce maximum water revenue, Neptune pioneering produced the
First Frost-Proof Meter
First Snap Joint Disc Chamber Construction
First Anti-Friction Thrust Roller Bearing Disc
First Heat-Proof Removable Rubber Bushings in the Register and Gear Train
First Successful Oil-Enclosed Gear Train
First Portable Test Meter
First Compound Meter
First Fire Service Meter officially approved by the Underwriters' Laboratories, Inc.,—



Trident Protectus

"Cash Registers of the Water Works Field"

Nothing will do but complete precision in the manufacturing of Trident and Lambert Water Meters. Which means that *every* part of *every* Meter is built to *exacting and closely gauged precision standards,* from the main casing down to the smallest pinion—which means maximum accuracy in registration and perfect interchangeability. In other words, maximum water revenue, longest service life, minimum upkeep.

Nearly 5¾ MILLION made and sold the world over

Pioneers in Meter Progress Yesterday—TODAY—Tomorrow

NEPTUNE METER COMPANY

50 East 42nd Street, New York City

Neptune Meter Company, Ltd., Toronto, Ontario

CONTROL-

Part of the Navy's "High Hat" Squadron coming into formation, under perfect control, after the take-off.

is essential to successful
CHLORINATION

"INADEQUATE control over purification methods was responsible for twenty per cent of all water borne diseases during the decade 1920 to 1929" (*so discloses the investigation of Wolman and Gorman as reported to the recent meeting of the American Public Health Association*) . . . Eighteen thousand cases of typhoid and dysentery could have been prevented with adequate chlorination...W & T Vacuum chlorinators positively control chlorination.

Their dependability is proven by the records of over three thousand machines now in daily service . . . Installed more than eight years ago the first Vacuum chlorinator is still giving excellent service. Maintenance cost has been less than 1% per year.

NO VACUUM CHLORINATOR HAS EVER WORN OUT

Ask for Technical Publication No. 38

A Product of

WALLACE & TIERNAN
COMPANY, INCORPORATED

Manufacturers of Chlorine Control Apparatus

NEWARK - - - NEW JERSEY

Branches in principal cities

"The only safe water is a sterilized water"

SA-28

OUR CONGRATULATIONS TO THE NEW ENGLAND WATER WORKS ASSOCIATION!

THIS remarkable index holds the key to a vast store of waterworks information and knowledge, covering as it does the transactions of the New England Water Works Association from 1883 to 1885 and the contents of the Association's Journal from 1886 to date.

The Lock Joint Pipe Company is not as old as the Association, having been established in 1905. But the 26 years which have intervened have given it a broad experience and made it not only the oldest but the largest company in its field, which is sewer and culvert pipe manufacturing, as well as pressure and subaqueous pipe manufacturing and pipe line constructing.

We wish the New England Water Works Association continued and increasing success.

LOCK JOINT PIPE COMPANY, Ampere, N. J.
Established 1905

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

CLASSIFIED DIRECTORY OF ADVERTISEMENTS.

PAGE

CAST IRON PIPE. (See Pipe, Cast Iron.)

CHEMICAL FEED APPARATUS.
Wallace & Tiernan Co., Inc. . . . vi

CHLORINATORS.
Wallace & Tiernan Co., Inc. . . . vi

ENGINEERS.
Ambursen Construction Co. . . . ii
Barrows, H. K. . . . ii
Conard, Wm. R. . . . ii
Fay, Spofford & Thorndike . . . ii
Hazen & Everett . . . ii
Metcalf & Eddy . . . ii
Symonds & Stevens . . . ii
Weston & Sampson . . . ii

FILTRATION PLANT EQUIPMENT.
Wallace & Tiernan Co., Inc. . . . vi

FURNACES, ETC.
The Leadite Co. . . . Back cover

HYDRANTS, FIRE.
Rensselaer Valve Co. "Corey" . . . iii

INSPECTION OF MATERIALS.
Conard, Wm. R. . . . ii

LEAK FINDERS.
Pitometer Co. . . . iii

METERS, WATER AND OIL.
Hersey Mfg. Co. . . . iv
Neptune Meter Co. . . . v
Pitometer Co. . . . ii

PIPE, CAST IRON (AND FITTINGS).
U. S. Cast Iron Pipe and Foundry Co. . . . x

PIPE, CONCRETE.
Lock Joint Pipe Co. . . . vii

PIPE JOINTING MATERIAL.
The Leadite Co. . . . Back cover

PITOMETERS.
Pitometer Co. . . . ii

SLEEVES AND VALVES, TAPPING.
Rensselaer Valve Co. . . . iii

SPECIFICATIONS, FORMS AND METER RATE SHEETS.
New England Water Works Association . . . iii

SUPPLIES AND TOOLS.
The Leadite Co. . . . Back cover

VALVE BOXES.
Rensselaer Valve Co. . . . iii

VALVES, GATE.
Rensselaer Valve Co. . . . iii

WATER WASTE DETECTION.
Pitometer Co. . . . ii

The illustration shows the deLavaud machine withdrawing to permit the removal of a newly formed pipe.

Why deLavaud pipe is superior in strength and flexibility

WHY is deLavaud Pipe the strongest cast iron pipe known? The answer can be found in the deLavaud machine shown above.

If you looked into the bore of this machine in operation, you would observe an accurately gauged metal mold revolving within a water-cooled jacket. When molten iron is fed into this rapidly whirling mold, it is held against the sides by centrifugal force — a force forty times greater than gravity. Gas bubbles and impurities are driven out of the metal. At the same time, the cooling action of the water jacket which encases the mold brings about a fine, even division of the iron particles.

Thus, upon close examination, you would find that deLavaud pipe metal is dense and fine-grained, free from gas bubbles and weakening impurities.

After coming from the machines, deLavaud pipe is uniformly annealed in a special annealing furnace. Here controlled heat further improves the structure of the metal, bringing about deLavaud pipe's flexibility and eliminating any possibility of casting strains.

In addition to making deLavaud pipe in accordance with U. S. government specifications, we are also furnishing this product in the various thicknesses and weights shown in the specifications of the American Water Works Association and the American Gas Association.

Write for complete information.

Our pipe bears the "Q-check" trademark of The Cast Iron Pipe Research Association.

United States Pipe and Foundry Co., Burlington, New Jersey

Sales Offices: New York, Philadelphia, Pittsburgh, Cleveland, Buffalo, Chicago, Dallas, Birmingham, Kansas City, Minneapolis, Seattle, San Francisco, Los Angeles